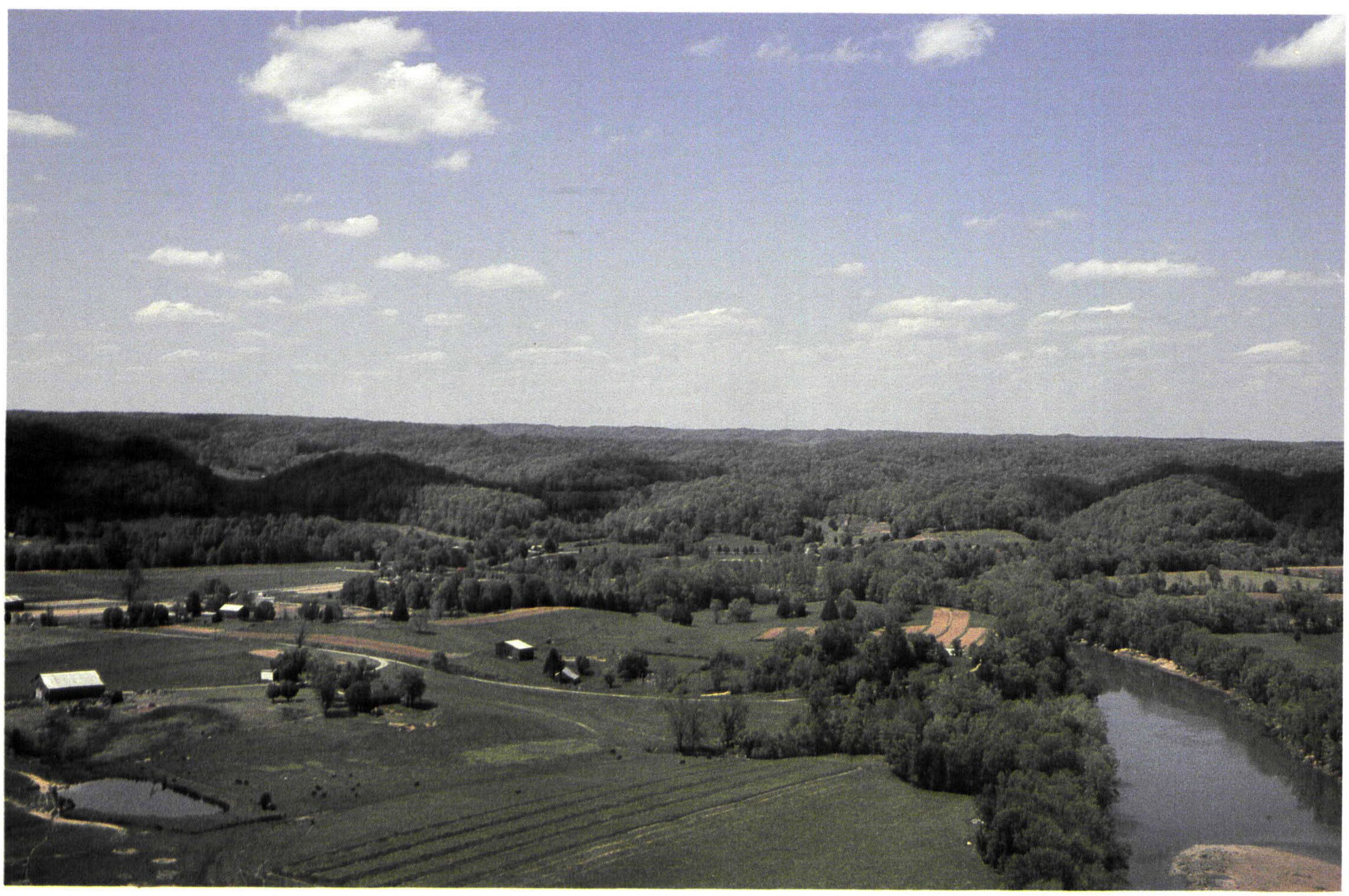
USDA United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Kentucky Natural Resources and Environmental Protection Cabinet and Kentucky Agricultural Experiment Station

Soil Survey of Cumberland County, Kentucky



How to Use This Soil Survey

General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

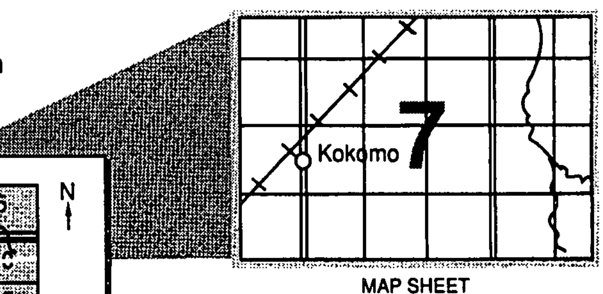
Detailed Soil Maps

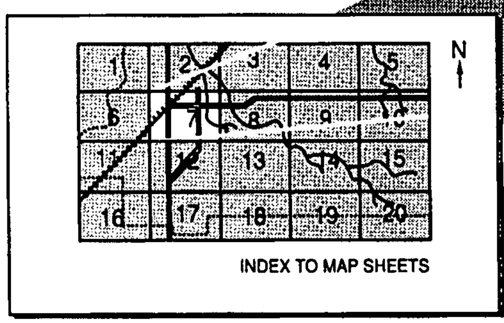
The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

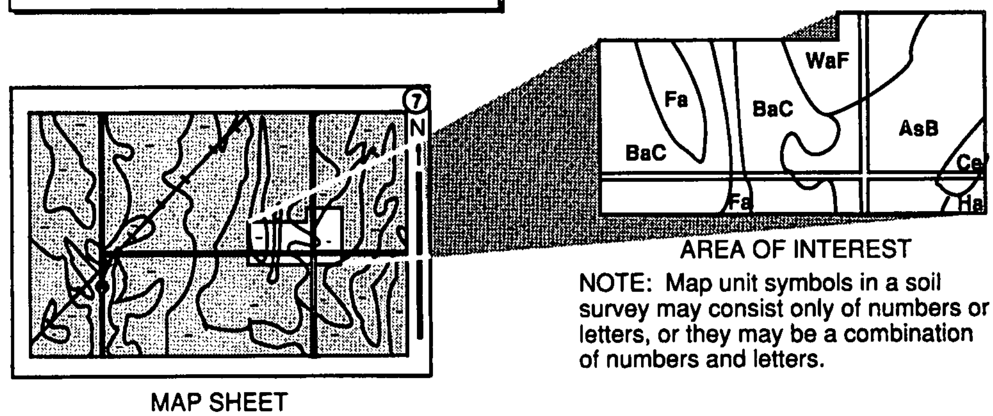
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map units symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.







NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1991. Soil names and descriptions were approved in 1991. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1991. This survey was made cooperatively by the Natural Resources Conservation Service, the Kentucky Natural Resources and Environmental Protection Cabinet, and the Kentucky Agricultural Experiment Station. The survey is part of the technical assistance furnished to the Cumberland County Conservation District.

Cover: The Cumberland River Valley and the adjacent uplands. The soils in the valley are in the Huntington-Elk-Nelse-Grigsby general soil map unit. The soils on uplands are in the Garmon-Newbern-Carpenter general soil map unit.

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Issued 1998

Summary of Tables

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

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Soil Survey of
Cumberland County, Kentucky

By Richard L. Livingston, Natural Resources Conservation Service

Fieldwork by Richard L. Livingston and Phillip G. Gregory, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the Kentucky Natural Resources and Environmental Protection Cabinet and the Kentucky Agricultural Experiment Station

CUMBERLAND COUNTY is in the south-central part of Kentucky (fig. 1). It is bounded on the south by Tennessee. In Kentucky, it is bounded by Monroe, Metcalfe, Adair, Russell, and Clinton Counties. Burkesville, the county seat and principal city, is located near the geographical center of the county. Burkesville has a population of about 1,800, and Cumberland County has a population of about 6,780 (*40,53*).

Cumberland County has a land area of 194,822 acres and a water area of 4,070 acres for a total area of 198,892 acres or about 311 square miles (*39,41*). The highest point, about 1,120 feet above sea level, is near the Tennessee line in the southwestern part of the county. The lowest point, about 540 feet above sea level, is on the western border where the Cumberland River exits the county.

Most of the acreage in the county is privately owned woodland and farmland. Dale Hollow State Park, covering about 3,400 acres (*21*), lies in the southeastern corner of the county and is mostly within Cumberland County. The U.S. Army Corps of Engineers administers an almost continuous narrow strip of land that borders Dale Hollow Lake.

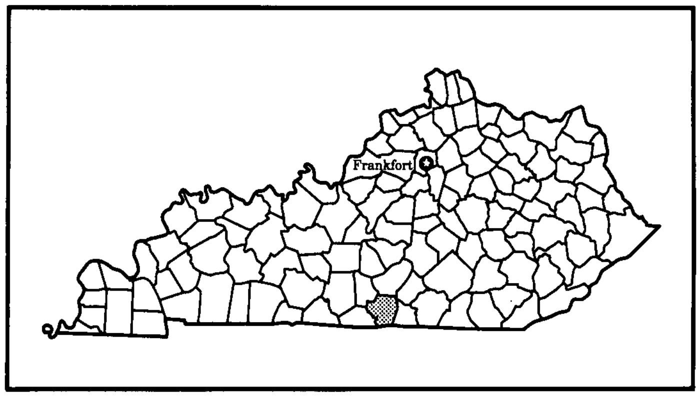

Figure 1.—Location of Cumberland County in Kentucky.

General Nature of the Survey Area

This section gives general information about Cumberland County. It briefly describes the history and settlement, physiography, relief and drainage, farming, natural resources, recreation, and climate (*36*).

History and Settlement

Cumberland County was organized in 1798 as the second county of the State of Kentucky. At that time, it included parts of Metcalfe, Monroe, Russell, Wayne, and Clinton Counties. It received its name from the Cumberland River. The river was named by Dr. Thomas Walker in 1750 in honor of the Duke of Cumberland, Prime Minister of England (*22,53*).

The first explorers in Cumberland County were known as the "Long Hunters" about 1770. The first record of these explorers was found in the northeastern part of the county on Buck Branch. "D. Boon 1771" is carved in a slate rock near a small sulphur spring (*22*).

Many of the first settlers were issued land grants for services in the Revolutionary War. These grants were recorded as early as 1798. Early settlements were made in Salt Lick Bend, Irish Bottom, Steel Bottom, and Washes Bottom. The area around Burkesville was originally known as Cumberland Crossing; it was one of the easiest places to cross the Cumberland River. Cumberland Crossing was renamed Burksville in 1810 after Ishum Burks, who donated the land for the town. The "e" was added to Burkesville during the 20th century (*22*).

The main transportation route for the county was via the Cumberland River. Numerous ferries crossed the Cumberland River. The last known steamboat navigated the upper Cumberland River in 1926. The construction of bridges on Kentucky Highway 90 in 1951 and Kentucky Highway 61 in 1961 enhanced the road system (*22*).

Physiography, Relief, and Drainage

Cumberland County is in the Highland Rim and in the Pennyroyal Land Resource Area (*36*). The county is dissected by the Cumberland River. Physiographic patterns and relief are mostly dictated by the drainage patterns of the Cumberland River and its tributaries. The major tributaries are Crocus, Marrowbone, Big Renox, Little Renox, and Bear Creeks. Most of the county drains toward the Cumberland River, which flows northeast to southwest near the middle of the county. The southeast part of the county drains southward into Dale Hollow Lake. Kettle Creek drains southwestward into Monroe County before reaching the Cumberland River.

Sloping to steep soils are on the higher ridges that divide the major drainages. Most of these areas are cleared and used for farming. Moderately steep to very steep soils are dominant on the side slopes of the drainageways that border the Cumberland River and its major tributaries. Most of these areas are wooded. Nearly level to steep soils are dominant on the flood plains, terraces, and foot slopes of the Cumberland River and its major tributaries. Most of these areas are cleared and are used for farming. All these areas are shown on the General Soil Map and are explained in more detail in the sections "General Soil Map Units" and "Geology and Topography."

Farming

According to the 1987 Census of Agriculture, about 115,800 acres, or 58 percent of the land in Cumberland County, was used for farming. The land area included 646 farms covering, on average, 179 acres each. About 77 percent of the farms had owner-operators, 17 percent had part-time owner-operators, and 6 percent had tenant-operators (*41*).

The main farm enterprises were livestock, livestock products, and crop production. Cattle and calves and dairy products accounted for most of the income related to livestock. Burley tobacco and hay accounted for most of the income related to crop production (*41*).

Livestock enterprises accounted for about 52 percent of the total farm income. Of this amount, the sale of cattle and calves made up about one-half. The sale of dairy products made up about one-fourth, and the sale of hogs and pigs made up about one-fifth (*41*).

Crop production accounted for about 47 percent of the total farm income. Of this amount, the sale of burley tobacco made up about four-fifths, the sale of hay and related crops made up about one-tenth, and the sale of corn and soybeans for grain made up about one-twelfth (*41*).

Land use remained fairly steady for the period from 1982 to 1987. The amounts of total woodland and idle cropland increased slightly and the amount of harvested cropland decreased slightly. The total number of cattle and calves decreased slightly. The number of beef cows increased, and the number of dairy cows and of hogs and pigs decreased sharply (*41*).

Natural Resources

Besides soil and water, the major natural resources in Cumberland County are trees, petroleum, natural gas, limestone, dolomite, and gravel.

Trees are one of the most important natural resources in the county. The wood industry employed about 50 people in 1988 (*19*).

Oil was first discovered in 1829 (*44*). Oil production began about the turn of the century and has been sporadic since that time. Wells are scattered throughout the county. Natural gas is produced from several wells and is used for heating and cooking in some homes (*42,43,44,45,46,47,48,49,50,51,52*).

There are no active limestone quarries in the county. An inactive limestone quarry is located near Grider. At this time, crushed limestone is transported from a quarry in an adjacent county and stockpiled for local sale. Limestone, siltstone, and dolomite from formations of Mississippian and Ordovician age are suitable for construction material. Some of the purer layers of limestone and dolomite are suitable for use as crushed stone and agricultural lime.

Gravel is available in limited quantities from gravel bars along the larger streams. It is used locally for private and county roads.

Recreation

Water-related activities are the most notable forms of recreation in Cumberland County. Part of Dale Hollow Lake is in the southern part of the county. Two commercial marinas offer restaurant facilities, camping, lodging, and boat rental. Dale Hollow Lake provides camping and fishing, boating, and other water sports. Smallmouth bass, largemouth bass, Kentucky bass, crappie, bluegill, trout, and various sunfish are common. The Cumberland River enters the northeast part of the county and exits from the southwest part. It provides fishing and boating, and can be accessed at a well maintained boat ramp in Burkesville or at several former ferry crossings. Trout fishing is popular on the Cumberland River (*19*).

Most of Dale Hollow State Park lies within Cumberland County. Besides its marina facilities, it offers camping and picnicking facilities, trails for hiking and horseback riding, a swimming pool, and a playground.

The Veterans Memorial Park in Burkesville has a swimming pool, lighted baseball and softball fields, an outdoor basketball court, lighted tennis courts, a miniature golf course, a picnic area, and a 3/8-mile running track.

Hunting is available for such upland wildlife as whitetailed deer, turkey, gray and fox squirrel, cottontail rabbit, mourning dove, and quail. Migrating waterfowl are also found on the Cumberland River and Dale Hollow Lake.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Summer Shade, Kentucky, in the period 1951 to 1988. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 37 degrees F and the average daily minimum temperature is 27 degrees. The lowest temperature on record, which occurred on January 23, 1963, is -28 degrees. In summer, the average temperature is 75 degrees, and the average daily maximum temperature is 87 degrees. The highest recorded temperature, which occurred on July 28, 1952, is 106 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 51 inches. Of this, about 26 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 21 inches. The heaviest 1-day rainfall during the period of record was 6.45 inches on September 9, 1970. Thunderstorms occur on about 45 days each year, and most occur in summer.

The average seasonal snowfall is about 13 inches. The greatest snow depth at any one time during the period of record was 13 inches. On average, 10 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 10 miles per hour, in spring.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries (*38*).

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research (*34*).

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management. Soil boundary lines do not completely join with adjoining counties because of differences in the design of general soil map units and changes in concepts of some soils.

Soil Descriptions

Gently Sloping to Very Steep Soils that are Very Deep to Shallow and Well Drained to Excessively Drained; on Dissected Uplands

This group consists of soils that have a loamy surface layer and a loamy or clayey subsoil. These soils formed in residuum and colluvium from interbedded calcareous siltstone, shale, and limestone. The underlying bedrock is dominantly Mississippian or Ordovician in age.

The two map units in this group make up about 66 percent of the county. They differ in kinds of soil and type of underlying bedrock.

Mixed hardwoods are on most steep and very steep soils on narrow ridgetops and side slopes. Most sloping soils in narrow valleys are cleared and are used for pasture, hayland, or row crops. Slope and depth to bedrock are the main limitations of this soil for most uses.

1. Garmon-Newbern-Carpenter

Moderately steep to very steep, well drained to excessively drained, very deep to shallow soils that have a loamy subsoil

This map unit consists of steep and very steep side slopes that are crested by moderately steep and steep ridges (fig. 2). The landscape has been dissected by a dendritic drainage system. This map unit is scattered throughout the county. At lower elevations, it is adjacent to nearly level and sloping soils that border the tributaries of the Cumberland River and Dale Hollow Lake. At upper elevations, it is adjacent to gently sloping to steep soils on ridges that divide major drainages. In most areas slope ranges from 12 to 65 percent. In some areas of palisades along the Cumberland River, slope is more than 100 percent.

This map unit makes up about 58 percent of the county. It is about 28 percent Garmon and similar soils, 24 percent Newbern and similar soils, 22 percent Carpenter and similar soils, and about 26 percent soils of minor extent.

Garmon soils are moderately steep to very steep, moderately deep, and well drained. They are on uplands. Typically, they have a surface layer of dark brown loam. The subsoil is dark yellowish brown channery silt loam in the upper part and yellowish brown channery silt loam in the lower part. Below this is hard, gray shale and siltstone.

Newbern soils are moderately steep to very steep, shallow, and somewhat excessively drained and excessively drained. They are mostly on upper side slopes and ridges. Typically, they have a surface layer of brown channery silt loam. The subsoil is brown channery silt loam in the upper part and yellowish brown channery silt loam in the lower part. Below this is hard, gray siltstone.

Carpenter soils are very steep, deep and very deep, and well drained. They are mostly on steep side slopes and foot slopes that have some colluvium. Typically, they have a surface layer of brown silt loam. The subsurface layer is dark yellowish brown silt loam. The subsoil is dark yellowish brown silt loam in the upper part, yellowish brown channery silty clay loam in the middle part, and yellowish brown channery silty clay in the lower part. Below this is soft or hard siltstone.

The soils of minor extent are the Chagrin and Sensabaugh soils on narrow flood plains; the Renox soils on alluvial fans and foot slopes; the Cynthiana and Faywood soils on lower side slopes; and the Dewey, Lonewood, and Caneyville soils on higher ridges. Areas of rock outcrop are also scattered throughout the map unit.

Most areas of these soils are used for woodland. A few areas on the lower, moderately steep and steep side slopes are cleared and are used for pasture.

These soils are poorly suited to pasture, hayland, or cultivated crops. Slope and depth to bedrock are the main limitations.

These soils are suited to woodland. Productivity is generally higher on the lower third of side slopes and on cool slopes. Yellow-poplar, red oak, white oak, red maple, and hickory are common. The main woodland management concerns are the erosion hazard, the equipment limitation, and plant competition.

These soils are suited to habitat for woodland wildlife.

Most areas of these soils are poorly suited to urban uses. Slope and depth to bedrock are the main limitations. On some lower side slopes slippage is a hazard.

2. Cynthiana-Faywood-Renox-Lowell

Gently sloping to very steep, well drained, very deep to shallow soils that have a clayey or loamy subsoil

This map unit consists of sloping to very steep side slopes that are crested by gently sloping to steep ridges. The landscape has been dissected by a dendritic drainage system. Sloping soils are on foot slopes and benches along major drainageways. This map unit is in the west-central part of the county. Most of the map unit is between the Cumberland River and Marrowbone Creek. Part is north of Marrowbone Creek. In most areas slope ranges from 6 to 50 percent. In some areas of palisades along the Cumberland River, slope is more than 100 percent.

This map unit makes up about 8 percent of the county. It is about 21 percent Cynthiana and similar soils, 16 percent Faywood and similar soils, 15 percent Renox and similar soils, 13 percent Lowell and similar soils, and 35 percent soils of minor extent.

Cynthiana soils are sloping to very steep, shallow, and well drained. They are on uplands. Typically, they have a surface layer of yellowish brown silty clay loam. The subsoil is yellowish brown clay in the upper part and yellowish brown gravelly silty clay in the lower part. Below this is hard limestone.

Faywood soils are sloping to very steep, moderately deep, and well drained. They are on uplands. Typically, they have a surface layer of dark yellowish brown silty clay loam. The subsoil is yellowish brown flaggy clay. Below this is hard limestone.

Renox soils are sloping to very steep, very deep, and well drained. They are on uplands. Typically, they have a surface layer of brown gravelly loam. The subsoil is dark yellowish brown and brown gravelly loam in the upper part, dark yellowish brown clay loam in the middle part, and dark yellowish brown and yellowish brown loam in the lower part.

Lowell soils are gently sloping to steep, deep and very deep, and well drained. They are on uplands. Typically, they have a surface layer of dark yellowish brown silt loam. The subsoil is strong brown clay in the upper part and strong brown, mottled silty clay loam in the lower part.

The soils of minor extent are the Chagrin and Sensabaugh soils on narrow flood plains, the Rohan soils on side slopes and ridges, and the Newbern and Garmon soils on side slopes and ridges. Areas of rock outcrop are also scattered throughout this map unit.

About half the acreage of these soils is used for woodland. The rest is cleared and is used for pasture, hayland, or cultivated crops.

The gently sloping and sloping soils in this map unit are suited to cultivated crops. The main management concerns are controlling erosion and maintaining tilth and fertility. In most areas crop rotation is needed.

The gently sloping to moderately steep soils are well suited to pasture or hayland. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Steep and very steep soils are poorly suited to use as pasture or hayland. Slope, the erosion hazard, and depth to bedrock are the main limitations.

These soils are suited to woodland. Productivity is generally higher on the lower third of side slopes, on cool slopes, and on moderately deep to very deep soils. Upland oaks, hickory, eastern redcedar, and honey locust are common. The main woodland management concerns are the erosion hazard, the equipment limitation, and plant competition.

These soils are suited to woodland wildlife habitat. Most moderately steep to very steep areas of these soils are poorly suited to urban uses. Some of the gently sloping and sloping areas are well suited to urban uses. Slope and depth to bedrock are the main limitations. Low strength is a limitation for roads and streets.

Nearly Level to Steep Soils that are Very Deep to Moderately Deep and are Well Drained or Moderately Well Drained; on Upland Ridges

This group consists of soils that have a loamy surface layer and a clayey or loamy subsoil. These soils formed in

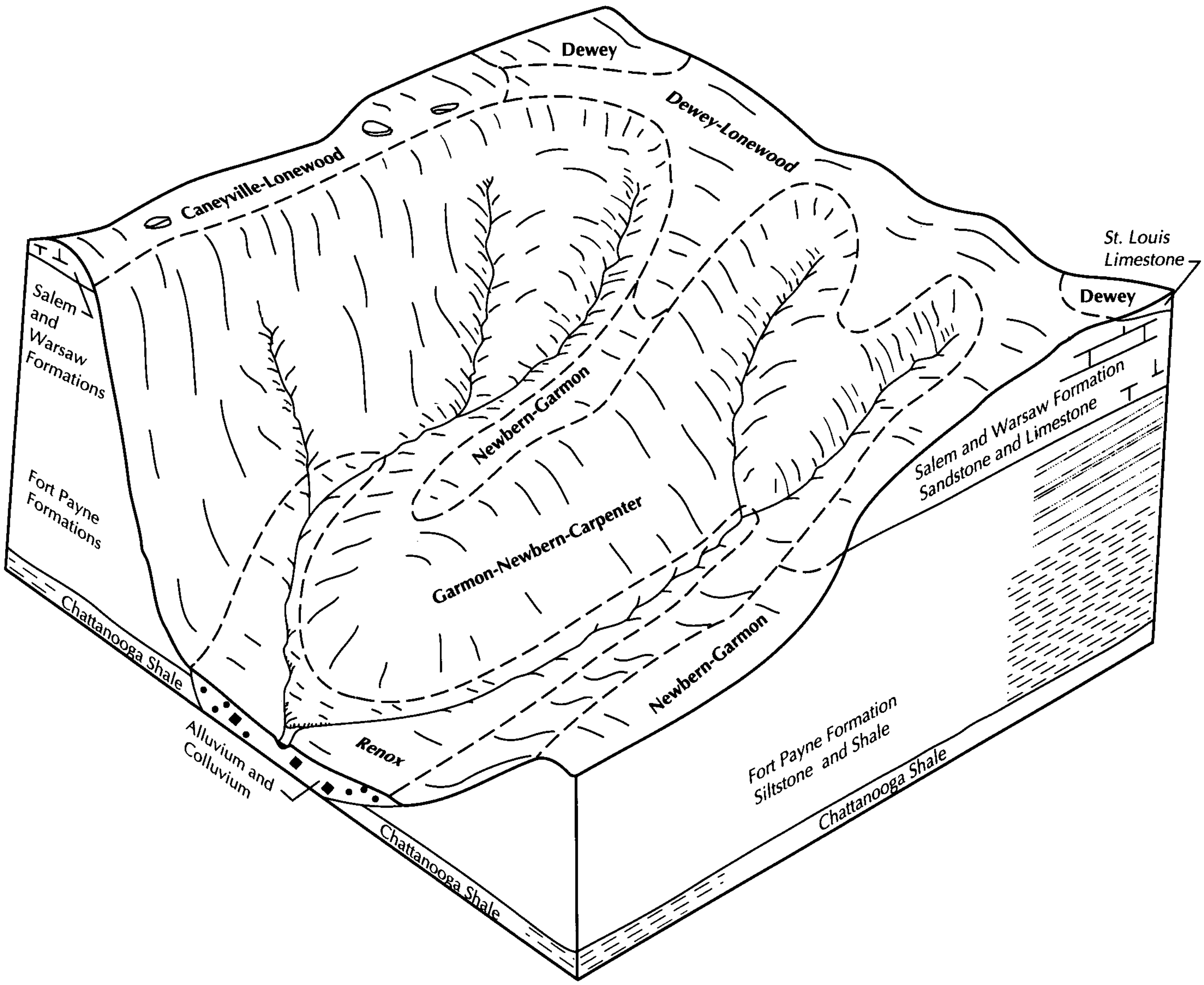

Figure 2.—Relationship of the soils in Garmon-Newbern-Carpenter general soil map unit and the underlying material.

residuum and old sediment deposits from weathered limestone, siltstone, and sandstone. The limestone contains varying amounts of chert and silica. The underlying bedrock is of Mississippian age.

The three map units in this group make up about 16 percent of the county. They differ in kinds of soil and type of underlying bedrock.

Most of the soils are cleared and used for pasture, hayland, or cultivated crops. Some moderately steep and steep soils are used for woodland. The erosion hazard, slope, depth to bedrock, and low strength are the main limitations for most uses.

3. Dewey-Lonewood-Caneyville

Gently sloping to steep, well drained, very deep to moderately deep soils that have a clayey or loamy subsoil

This map unit consists of gently sloping to steep, high ridges and plateaus that divide the major drainages in the county (fig. 3). Many areas are dotted with sinkholes and depressions. The larger areas of this map unit are south of the Cumberland River. In most areas slope ranges from 2 to 25 percent.

This map unit makes up about 13 percent of the county. It is about 50 percent Dewey and similar soils,

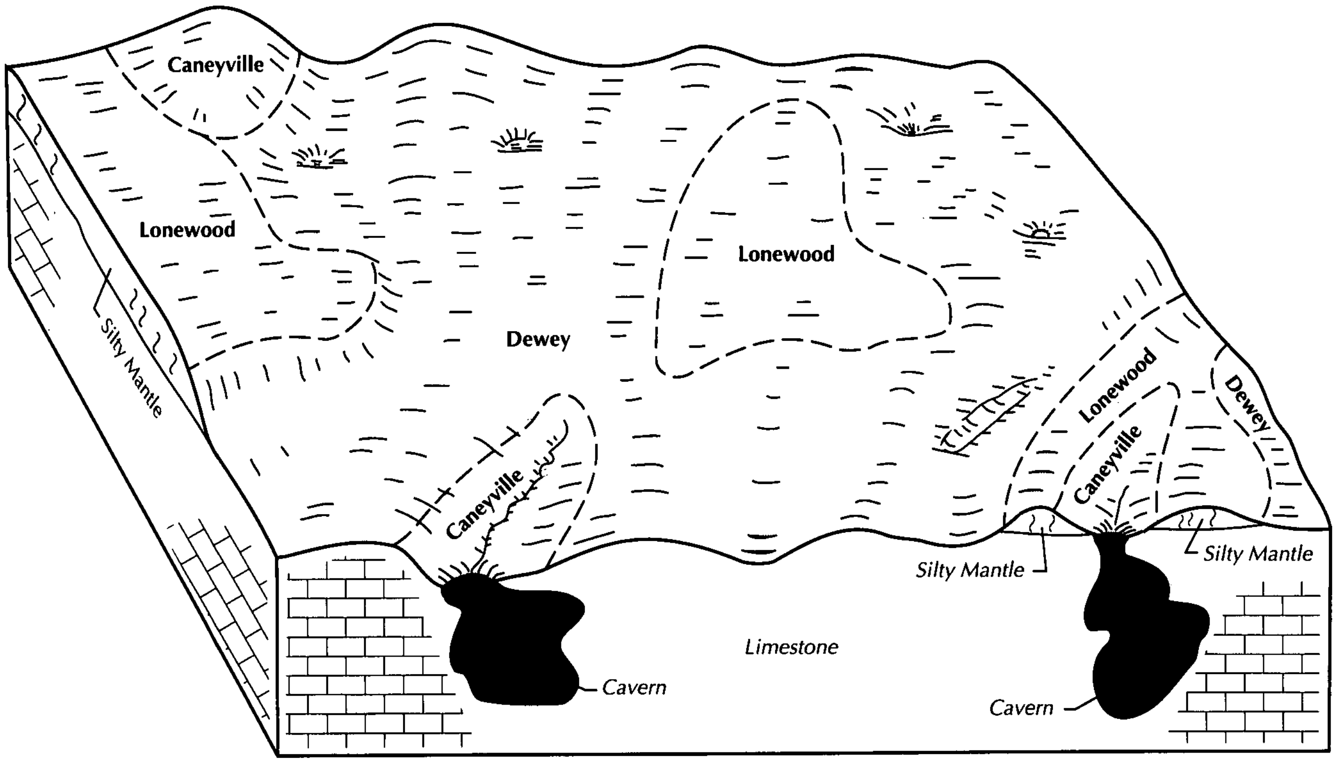

Figure 3.—Typical pattern of the soils and the underlying material in the Dewey-Lonewood-Caneyville general soil map unit.

27 percent Lonewood and similar soils, 10 percent Caneyville and similar soils, and 13 percent soils of minor extent.

Dewey soils are gently sloping to steep, very deep, and well drained. They are on uplands, mostly on higher lying ridges and side slopes. Typically, they have a surface layer of dark yellowish brown loam. The subsoil is red and dark red clay that has brown mottles in the upper part and red and strong brown mottled clay in the lower part.

Lonewood soils are gently sloping to steep, deep and very deep, and well drained. They are on uplands. Lonewood soils are mostly on ridges and plateaus adjacent to Dewey soils. Typically, they have a surface layer of brown silt loam. The subsurface layer is light yellowish brown silt loam. The subsoil is yellowish brown loam in the upper part, strong brown and yellowish red clay and clay loam in the middle part, and mottled yellowish red, brownish yellow, and yellowish brown gravelly sandy loam in the lower part. The underlying material is brownish yellow gravelly sandy loam. Below this is soft sandstone.

Caneyville soils are sloping to steep, moderately deep, and well drained. They are on uplands. Areas of Caneyville soils are generally associated with rock outcrop, which in some places indicates either a change in geologic materials or severe erosion. Typically, the surface layer is brown silt loam. The subsoil is strong brown and reddish yellow loam in the upper part, yellowish red clay in the middle part, and yellowish red clay loam in the lower part. Below this is hard limestone.

The soils of minor extent are the moderately steep Newbern and Garmon soils on narrow ridges and side slopes and the Crider and Trimble soils on ridges and side slopes. Areas of rock outcrop are scattered throughout the map unit.

Most areas of these soils are used for pasture, hayland, or cultivated crops. Some of the moderately steep and steep areas are woodland.

These soils are suited to cultivated crops. The main management concerns are controlling erosion and maintaining tilth and fertility. In most areas crop rotation is needed.

These soils are well suited to pasture and hayland. On pasture and hayland, management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing.

These soils are suited to woodland. Common trees are upland oaks, hickory, and yellow-poplar. The main woodland management concern is the erosion hazard.

These soils are suited to woodland wildlife habitat. Most areas are suited to urban uses. Slope, depth to bedrock, slow permeability, clayey subsoil, and low strength are the main limitations.

4. Trimble-Caneyville-Crider

Gently sloping to steep, well drained, very deep to moderately deep soils that have a loamy or clayey subsoil

This map unit consists of gently sloping to steep, high ridges that divide major drainages in the county. Areas of this map unit are on ridges in Tanbark and Stalcup and on Bull Ridge in the southwestern part of the county. In most areas slope ranges from 6 to 25 percent.

This map unit makes up about 2 percent of the county. It is about 40 percent Trimble and similar soils, 18 percent Caneyville and similar soils, 11 percent Crider and similar soils, and 31 percent soils of minor extent.

Trimble soils are gently sloping to steep, very deep and deep, and well drained. They are on ridges and side slopes on uplands. Typically, they have a surface layer of dark yellowish brown cobbly silt loam. The subsoil is strong brown cobbly loam in the upper part, strong brown cobbly silty clay loam in the middle part, and reddish yellow cobbly silty clay loam in the lower part.

Caneyville soils are sloping to steep, moderately deep, and well drained. They are on uplands. Areas of Caneyville soils are generally near rock outcrop that, in places, indicates either different geologic materials or severe erosion. Typically, these soils have a surface layer of brown silt loam. The subsoil is strong brown and reddish yellow loam in the upper part, yellowish red clay in the middle part, and yellowish red clay loam in the lower part. Below this is hard limestone.

Crider soils are gently sloping and sloping, very deep, and well drained. They are on ridges and side slopes on uplands. Typically, they have a surface layer of brown silt loam. The subsoil is strong brown silty clay loam in the upper part, yellowish red silty clay loam in the middle part, and yellowish red silty clay in the lower part.

The soils of minor extent are the Newbern and Garmon soils on narrow ridges and side slopes and the Dewey and Lonewood soils on ridges and side slopes. Areas of rock outcrop are scattered throughout the map unit.

Most areas of these soils are used for pasture, hayland, or cultivated crops. Some of the moderately steep and steep areas are woodland.

These soils are suited to cultivated crops. The main management concerns are controlling erosion and maintaining tilth and fertility. In most areas crop rotation is needed.

These soils are well suited to pasture and hayland. On pasture and hayland, the management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing.

These soils are suited to woodland. Common trees are upland oaks, hickory, and yellow-poplar. The main woodland management concerns are the erosion hazard and plant competition.

These soils are suited to habitat for woodland wildlife.

Most areas of these soils are suited to urban uses. Slope, depth to bedrock, slow permeability, clayey subsoil, cobbly layers, and low strength are the main limitations.

5. Lonewood-Dewey-Teddy

Nearly level to steep, well drained and moderately well drained, very deep and deep soils that have a loamy or clayey subsoil

This map unit consists of nearly level to steep soils on ridges and plateaus. Many areas are dotted with depressions. This map unit is in the east-central part of the county in the Smith Grove-String Ridge area. In most areas slope ranges from 1 to 25 percent.

This map unit makes up about 1 percent of the county. It is about 40 percent Lonewood and similar soils, 30 percent Dewey and similar soils, 20 percent Teddy and similar soils, and 10 percent soils of minor extent.

Lonewood soils are gently sloping to steep, deep and very deep, and well drained. They are on uplands. Typically, they have a surface layer of brown silt loam. The subsurface layer is light yellowish brown silt loam. The subsoil is yellowish brown loam in the upper part, strong brown and yellowish red clay and clay loam in the middle part, and mottled yellowish red, brownish yellow, and yellowish brown gravelly sandy loam in the lower part. The underlying material is brownish yellow gravelly sandy loam. Below this is soft sandstone.

Dewey soils are gently sloping to steep, very deep, and well drained. They are on uplands, mostly on higher lying ridges and side slopes. Typically, they have a surface layer of dark yellowish brown loam. The subsoil is red and dark red clay that has brown mottles in the upper part and strong brown and red, mottled clay in the lower part.

Teddy soils are nearly level and gently sloping, very deep, and moderately well drained. They are on uplands, mostly on smooth ridges and plateaus and near drainageways. Typically, they have a surface layer of brown loam. The subsurface layer is light yellowish brown loam. The subsoil is light yellowish brown and brownish yellow loam in the upper part. In the lower part it is a firm, brittle fragipan of brownish yellow loam that has light brownish gray and gray mottles.

The soils of minor extent are the Newbern and Garmon soils on narrow ridges and side slopes and the Trimble soils on ridges and side slopes. Areas of rock outcrop are scattered throughout the map unit.

Most areas of these soils are used for hayland, pasture, or cultivated crops. Some of the moderately steep and steep areas and the wetter areas are woodland.

These soils are suited to cultivated crops. The main management concerns are controlling erosion and maintaining tilth and fertility. In most areas crop rotation is needed.

These soils are well suited to pasture and hayland. On pasture and hayland, the management concerns are maintaining an adequate stand and preventing overgrazing.

These soils are suited to woodland. Common trees are upland oaks, hickory, sugar maple, and yellow-poplar. The main management concerns are the erosion hazard and plant competition.

These soils are suited to habitat for woodland wildlife.

Most areas of these soils are suited to urban uses. Slope, slow permeability, clayey subsoil, and the seasonal high water table are the main limitations.

Nearly Level to Steep Soils that are Very Deep and Well Drained or Moderately Well Drained; on Flood Plains, Terraces, and Banks of the Cumberland River

This group consists of soils that have a loamy surface layer and a loamy or clayey subsoil. These soils formed in alluvium from limestone, siltstone, sandstone, and shale.

The two map units in this group make up about 9 percent of the county. They differ in kinds of soils.

Most of the soils are cleared and are used for pasture, hayland, or cultivated crops. The erosion hazard and slope are the main limitations for most uses.

6. Huntington-Elk-Nelse-Grigsby

Nearly level to steep, well drained, very deep soils that have a loamy subsoil

This map unit is along the Cumberland River (fig. 4). It is on nearly level flood plains, nearly level and gently sloping terraces, and moderately steep and steep riverbanks. In most areas slope ranges from 0 to 25 percent.

This map unit makes up about 5 percent of the county. It is about 20 percent Huntington and similar soils, 20 percent Elk and similar soils, 18 percent Nelse and similar soils, 10 percent Grigsby and similar soils, and 32 percent soils of minor extent.

Huntington soils are on nearly level and gently sloping flood plains. These soils are protected from flooding by Wolf Creek Dam. Typically, they have a surface layer of brown silt loam. The subsurface layer is dark brown silt loam. The subsoil is dark yellowish brown loam in the upper part, dark yellowish brown silty clay loam in the middle part, and dark brown silty clay loam in the lower part.

Elk soils are on nearly level to steep river terraces. Typically, they have a surface layer of brown silt loam. The subsoil is dark yellowish brown silt loam in the upper part and yellowish brown silty clay loam in the middle part. The lower part is strong brown silty clay loam that has yellowish brown mottles.

Nelse soils are on sloping to steep riverbanks. The lower two-thirds of the riverbank is subject to frequent flooding. Typically, these soils have a surface layer of dark brown fine sandy loam. The substratum is brown sandy loam in the upper part and dark yellowish brown, stratified fine sandy loam, silt loam, and silty clay loam in the lower part.

Grigsby soils are on nearly level and gently sloping flood plains and natural levees. These soils are protected from flooding by Wolf Creek Dam. Typically, they have a surface layer of brown fine sandy loam. The subsoil is brown fine sandy loam in the upper part and dark yellowish brown fine sandy loam in the lower part. The substratum is dark yellowish brown and yellowish brown loamy fine sand.

The soils of minor extent are the Chagrin, Egam, Newark, Stokly, and Melvin soils on flood plains, the Lawrence and Monongahela soils on adjacent terraces, and the Holston and Waynesboro soils on higher adjacent terraces.

Most areas of these soils are used for pasture, hayland, or cultivated crops. The moderately steep and steep riverbanks are mostly woodland.

These soils are suited to cultivated crops. The main management concerns are controlling erosion and maintaining tilth and fertility.

These soils are well suited to pasture and hayland. On pasture and hayland, management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing.

These soils are well suited to woodland. Common trees are American sycamore, red maple, yellow-poplar, river birch, and sweet gum. The main woodland management concern is plant competition.

These soils are suited to urban uses. Slope, low strength, and slow permeability are the main limitations. Slope and flooding are limitations on the moderately steep and steep riverbanks.

7. Holston-Monongahela-Waynesboro

Gently sloping to steep, well drained or moderately well drained, very deep soils that have a loamy or clayey subsoil

This map unit is along the Cumberland River (fig. 4). It is on gently sloping and sloping ridges and steep side slopes of terraces. In most areas slope ranges from 2 to 25 percent.

This map unit makes up about 4 percent of the county. It is about 40 percent Holston and similar soils, 25 percent Monongahela and similar soils, 20 percent Waynesboro and similar soils, and 15 percent soils of minor extent.

Holston soils are on gently sloping and sloping ridges and moderately steep and steep side slopes. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown silt loam in the upper part and strong brown clay loam in the lower part.

Monongahela soils are on gently sloping and sloping ridges and side slopes. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown loam in the upper part. The middle part is a firm, brittle fragipan of brownish yellow loam and sandy clay loam that has gray mottles. The lower part is a firm, brittle fragipan. It is brown and yellowish brown fine sandy loam that has gray mottles.

Waynesboro soils are on sloping to steep side slopes. Typically, they have a surface layer of dark yellowish brown loam. The subsoil is strong brown clay in the upper part, yellowish red clay loam in the middle part, and strong brown loam in the lower part.

The soils of minor extent are the Chagrin, Newark, Melvin, Sensabaugh, and Stokly soils on flood plains; the Elk and Lawrence soils on adjacent terraces; and the Cynthiana, Faywood, and Lowell soils on adjacent uplands.

Most areas of these soils are used for pasture, hayland, or cultivated crops. Some of the moderately steep and steep soils are woodland.

These soils are suited to cultivated crops. The main management concerns are controlling erosion and maintaining tilth and fertility. In most areas crop rotation is needed.

These soils are well suited to pasture and hayland. On pasture and hayland, management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing.

These soils are well suited to woodland. Common trees are upland oaks, sugar maple, yellow-poplar, and shortleaf pine. The main management concerns are the erosion hazard and plant competition.

These soils are suited to urban uses. Slope, clayey subsoil, low strength, and slow permeability are the main limitations.

Nearly Level to Very Steep Soils that are Very Deep and Well Drained; on Flood Plains, Alluvial Fans, Foot Slopes, and Terraces

This group consists of soils that have a loamy surface layer and subsoil. These soils formed in alluvium derived from limestone, siltstone, shale, and sandstone.

This group consists of one map unit and makes up about 9 percent of the county.

Most of the soils are cleared and are used for pasture,

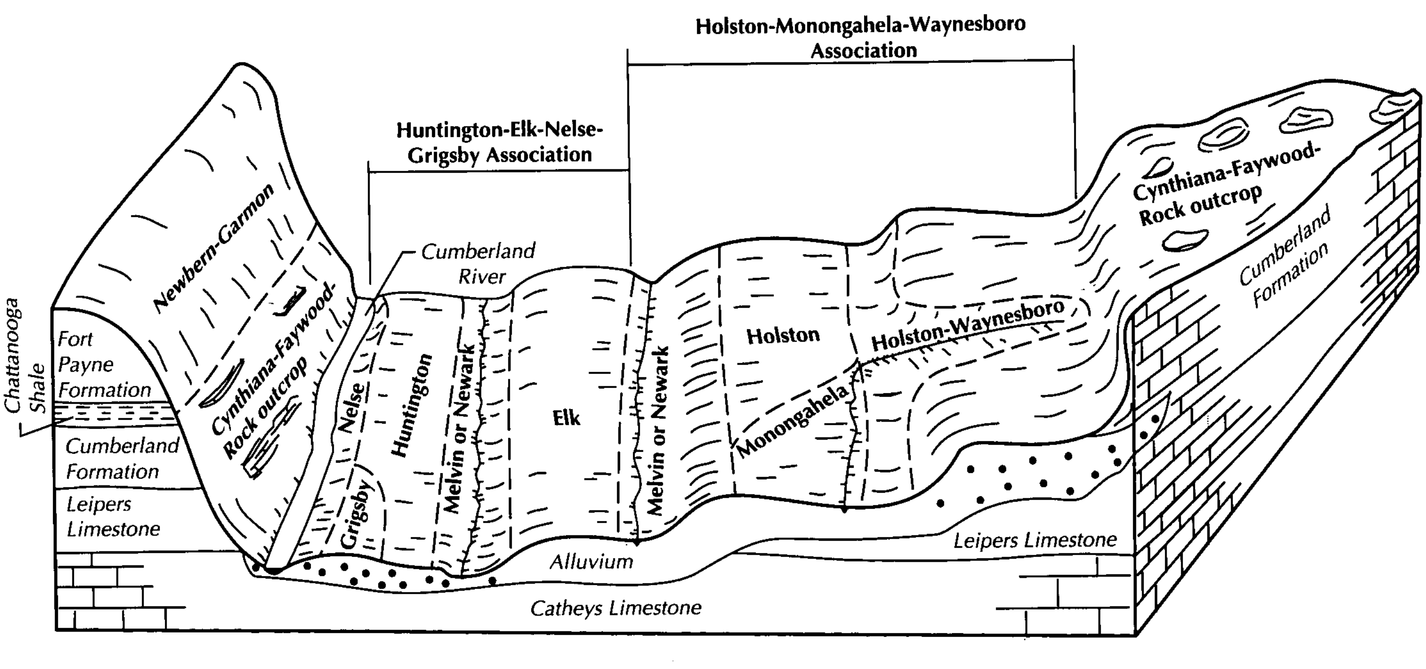

Figure 4.—Typical pattern of the soils in the Huntington-Elk-Nelse-Grigsby and Holston-Monongahela-Waynesboro general soil map units and the underlying material.

hay, or cultivated crops. The erosion hazard and flooding are the main limitations for most uses.

8. Renox-Chagrin-Sensabaugh

Nearly level to very steep, well drained, very deep soils that have a loamy subsoil

This map unit consists of soils on flood plains, alluvial fans, foot slopes, and terraces along the major tributaries of the Cumberland River. This map unit is scattered throughout the county. The larger areas are along Big Renox Creek, Little Renox Creek, Crocus Creek, and Bear Creek. In most areas slope ranges from 0 to 25 percent.

This map unit makes up about 9 percent of the county. It is about 34 percent Renox and similar soils, 28 percent Chagrin and similar soils, 22 percent Sensabaugh and similar soils, and 16 percent soils of minor extent.

Renox soils are sloping to very steep, very deep, and well drained. They are on foot slopes and alluvial fans. Typically, they have a surface layer of brown gravelly loam. The subsoil is dark yellowish brown and brown gravelly loam in the upper part, dark yellowish brown clay loam in the middle part, and dark yellowish brown and yellowish brown loam in the lower part.

Chagrin soils are nearly level and gently sloping, very deep, and well drained. They are on flood plains. Typically, they have a surface layer of dark yellowish brown loam. The subsurface layer is brown loam. The subsoil is dark yellowish brown loam in the upper part and dark yellowish brown sandy clay loam in the lower part. The substratum is yellowish brown and dark yellowish brown, stratified sandy loam and gravel.

Sensabaugh soils are nearly level and gently sloping, very deep, and well drained. They are on flood plains and alluvial fans. Typically, they have a surface layer of brown gravelly loam. The subsoil is dark yellowish brown silt loam in the upper part, dark brown gravelly loam in the middle part, and brown very gravelly sandy loam in the lower part. The substratum is mottled dark gray and light olive brown gravelly loam in the upper part and light olive brown extremely gravelly sandy clay loam in the lower part.

The soils of minor extent are the Newark and Melvin soils on adjacent flood plains; the Elk, Holston, and Monongahela soils on adjacent terraces; and the Lowell, Faywood, and Cynthiana soils on adjacent uplands.

Most areas of these soils are used for pasture, hayland, or cultivated crops. A few areas are woodland.

These soils are suited to cultivated crops. The main management concerns are controlling erosion and maintaining tilth and fertility.

These soils are well suited to pasture and hayland. On pasture and hayland, management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing.

These soils are well suited to woodland. Common trees are black cherry, yellow-poplar, oaks, and red maple. The main woodland management concern is plant competition.

These soils are suited to urban uses. Flooding and the seasonal high water table are the main limitations on flood plains. Slope is the main limitation on alluvial fans and foot slopes.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils are rated as to their suitability for various uses. They are divided into four groups: well suited, suited, poorly suited, and generally not suited.

Soils that are *well suited* have favorable properties for the specified use and limitations are easy to overcome. Good performance and low maintenance can be expected.

Soils that are *suited* have moderately favorable properties for the specific use. One or more properties make these soils less desirable than well suited soils.

Soils that are *poorly suited* have one or more properties unfavorable for the selected use. Overcoming the limitation requires special design, extra maintenance, or costly alteration.

Soils that are generally *not suited* do not need the expected performance for the expected use or extreme measures are needed to overcome the undesirable features.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Elk silt loam, 2 to 6 percent slopes, is a phase of the Elk series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Garmon-Carpenter-Newborn complex, rocky, 12 to 25 percent slopes, eroded, is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

CaD2—Caneyville-Lonewood complex, rocky, 6 to 25 percent slopes, eroded

This complex consists of sloping to steep, moderately deep to very deep, well drained soils on side slopes and convex ridgetops. Erosion has removed about 25 to 75 percent of the surface layer. Mapped areas range from about 3 to 1,000 acres. The Caneyville and Lonewood soils are in areas so intricately mixed or so small in size that they could not be separated at the scale used in mapping. The intricate soil patterns are influenced mainly by depth to bedrock, which varies within short distances. Rock outcrop is scattered throughout this map unit.

The Caneyville and similar soils make up about 40 percent of this map unit. The Lonewood and similar soils make up about 35 percent. The rest was mapped as inclusions.

Typically, the Caneyville soil has a surface layer of brown silt loam about 10 inches thick. The subsoil extends to a depth of 36 inches. In the upper part, to a depth of 19 inches, it is strong brown and reddish yellow loam. In the middle part, to a depth of 32 inches, it is yellowish red clay. In the lower part, to a depth of 36 inches, it is yellowish red clay loam. Below that is coarse-grained limestone.

The Caneyville soil is low in organic matter content. Permeability is moderately slow. Available water capacity is moderate. Surface runoff is rapid. The root zone is moderately deep. Shrink-swell potential is moderate. Bedrock is at a depth of 20 to 40 inches.

Typically, the Lonewood soil has a surface layer of brown silt loam about 7 inches thick. The subsurface layer, to a depth of 14 inches, is light yellowish brown silt loam. The subsoil extends to a depth of 46 inches. In the upper part, to a depth of 20 inches, it is yellowish brown loam. In the middle part, to a depth of 34 inches, it is strong brown and yellowish red clay and clay loam. In the lower part it is mottled yellowish red, brownish yellow, and yellowish brown gravelly sandy loam. The substratum, to a depth of 59 inches, is brownish yellow gravelly sandy loam. Soft sandstone extends to a depth of 71 inches.

The Lonewood soil is low in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is rapid. The root zone is deep or very deep. Siltstone or sandstone is at a depth of 40 to 65 inches or more.

Included with this complex in mapping, on similar landscapes, are small areas of Dewey soils. Also included, in the southern part of the county, are areas of deep and very deep, clayey soils that have slow permeability. Also included are some severely eroded areas of Caneyville and Lonewood soils. Also included are a few areas where rock outcrop covers more than 10 percent of the surface. The included areas make up about 25 percent of this map unit. Most areas are less than 3 acres.

In most areas these soils are used for hay, pasture, or woodland. Many cleared areas have reverted to brushy undergrowth.

These soils are poorly suited to cultivated crops. Slope, rock outcrop, and depth to bedrock are major limitations for farm equipment. Erosion is a severe hazard if the soils are cultivated.

These soils are suited to pasture. Rockiness limits use of the soils as hayland. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, maintaining fertility, and a well planned clipping schedule help to maintain a good stand of forage species.

These soils are suited to woodland. Upland oaks, hickories, and sugar maple are common. Some trees preferred for planting are Virginia pine, white oak, and eastern white pine. Management concerns are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. Erosion is a hazard generally on roads and trails. Erosion can be controlled by laying out roads on or near the contour and by protecting permanent roads with water bars, culverts, and gravel. Slope generally limits only large, specialized harvesting and planting equipment. Slopes are generally short or broken enough so that small tractors, skidders, dozers, and trucks can be used for harvesting and planting. Seedling mortality is a limitation generally on the Caneyville soil and in areas near rock outcrops. When planting, careful selection of sites regarding depth to bedrock is needed. When establishing a new forest crop, plant competition can be a problem on favorable sites. Undesirable plants can be controlled by using herbicides or cutting.

These soils are poorly suited to most urban uses. Slope, depth to bedrock, rock outcrop, and the clayey texture of the subsoil are limitations for most sanitary facilities and building site development. Slope and low strength are limitations for local roads and streets. Proper design, installation, and site preparation help to overcome some of these limitations.

The Caneyville and Lonewood soils are in capability subclass VIs.

Cg—Chagrin loam, occasionally flooded

This is a very deep, well drained, nearly level and gently sloping soil on flood plains of streams throughout the county (fig. 5). Areas of this soil are long and narrow in shape and range from about 3 to 590 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark yellowish brown loam about 10 inches thick. The subsurface layer, to a depth of 25 inches, is brown loam. The subsoil extends to a depth of 41 inches. In the upper part it is dark yellowish brown loam to a depth of 31 inches. In the lower part it is dark yellowish brown sandy clay loam. The substratum extends to a depth of 75 inches or more. It is yellowish brown and dark yellowish brown sandy loam, stratified with gravel.

This soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is slow. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots. A seasonal high water table is at a depth of 48 to 72 inches in late winter and spring. In most areas this soil is subject to occasional flooding of very brief duration in late winter and spring about once every 5 to 50 years. In some areas the soil is subject to scour and deposition caused by streambank overflow and runoff from adjacent slopes. In some areas streambanks are unstable and are subject to undercutting and erosion.

Included with this Chagrin soil in mapping, on similar landscapes, are small areas of Egam, Grigsby, Melvin, Newark, and Sensabaugh soils. Some areas of Melvin and Newark soils are identified by a special wet spot symbol on the soil maps. Also included are areas of soils that are similar to the Chagrin soil but that are subject to rare flooding. These soils are generally higher in elevation or are adjacent to deeply entrenched stream channels. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco, corn, soybeans, and some garden crops.

This soil is well suited to most common row crops, garden crops, and small grain. If properly managed, intensive cropping can be used. Management concerns are flooding, the soil tilth, and the soil fertility. In some years small grain and other winter crops can be damaged by flooding. Conservation tillage, cover crops, and lime and fertilizer help to maintain soil tilth and fertility.

This soil is well suited to hay and pasture. Most of the common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. In some years hay crops can be damaged by flooding in spring. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Yellow-poplar, sugar maple, and black cherry are common. Yellow-poplar and eastern white pine are preferred for planting on this soil. Plant competition and seedling mortality are management concerns when establishing a new forest crop.

This soil is generally unsuited to building site development unless guidelines and restrictions for building on flood plains are followed.

This soil is in capability subclass IIw.

CrB—Crider silt loam, 2 to 6 percent slopes

This is a very deep, well drained, gently sloping soil on broad, smooth ridgetops on uplands. Some areas of this soil are karst. Most areas of this soil are long and narrow or roughly oval in shape and range from about 3 to 45 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil extends to a depth of 76 inches or more. In the upper part, to a depth of 33 inches, it is strong brown silty clay loam. In the middle part, to a depth of 48 inches, it is yellowish red silty clay loam. In the lower part it is yellowish red silty clay.

This soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots. Shrink-swell potential is moderate.

Included with this Crider soil in mapping, on similar landscapes, are small areas of Caneyville, Dewey, and Trimble soils. Also included are small areas of eroded Crider soils. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. Some areas are used for homesites and gardens.

This soil is well suited to all common row crops, garden crops, and small grain. If properly managed, intensive cropping can be used. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a moderate hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Terraces, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration. Lime and fertilizer help to maintain soil tilth and fertility.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Red oak, white oak, and yellow-poplar are common. Yellow-poplar, eastern white pine, and black walnut are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

The soil is well suited to most urban uses. Moderate shrinking and swelling is a limitation for some building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome these limitations.

This soil is in capability subclass IIe.

CrC2—Crider silt loam, 6 to 12 percent slopes, eroded

This is a very deep, well drained, sloping soil on convex ridgetops and side slopes on uplands. Erosion has removed about 25 to 75 percent of the original surface layer. Some areas of this soil are karst. Most areas of this soil are long and narrow or irregular in shape and range from about 3 to 50 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil extends to a depth of 76 inches or more. In the upper part, to a depth of 33 inches, it is strong brown silty clay loam. In the middle part, to a depth of 48 inches, it is yellowish red silty clay loam. In the lower part it is yellowish red silty clay.

This soil is low or moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots. Shrink-swell potential is moderate.

Included with this Crider soil in mapping, on similar landscapes, are small areas of Caneyville, Dewey, Lonewood, and Trimble soils and isolated areas of rock outcrop. Also included are small areas of severely eroded Crider soils. The included areas make up about 15 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, or row crops. A few areas are used for woodland. Some areas are used for homesites and gardens.

This soil is suited to all common row crops, garden crops, and small grain. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. In most areas crop rotation is needed. Terraces, diversions, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Red oak, white oak, and yellow-poplar are common. Yellow-poplar, eastern white pine, and black walnut are preferred for planting. Plant competition is a management concern when establishing a new forest crop.

The soil is suited to most urban uses. Slope and moderate shrinking and swelling are limitations for some building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is in capability subclass IIIe.

CyF2—Cynthiana-Faywood-Rock outcrop complex, 12 to 50 percent slopes, eroded

This complex is on uplands. It consists of moderately steep to very steep, shallow and moderately deep, well drained and somewhat excessively drained soils and areas of Rock outcrop. Erosion has removed about 25 to 75 percent of the original surface layer. Slopes are convex or linear. Mapped areas range from about 5 to 860 acres.

The Cynthiana and Faywood soils and areas of Rock outcrop are in areas so intricately mixed or so small in

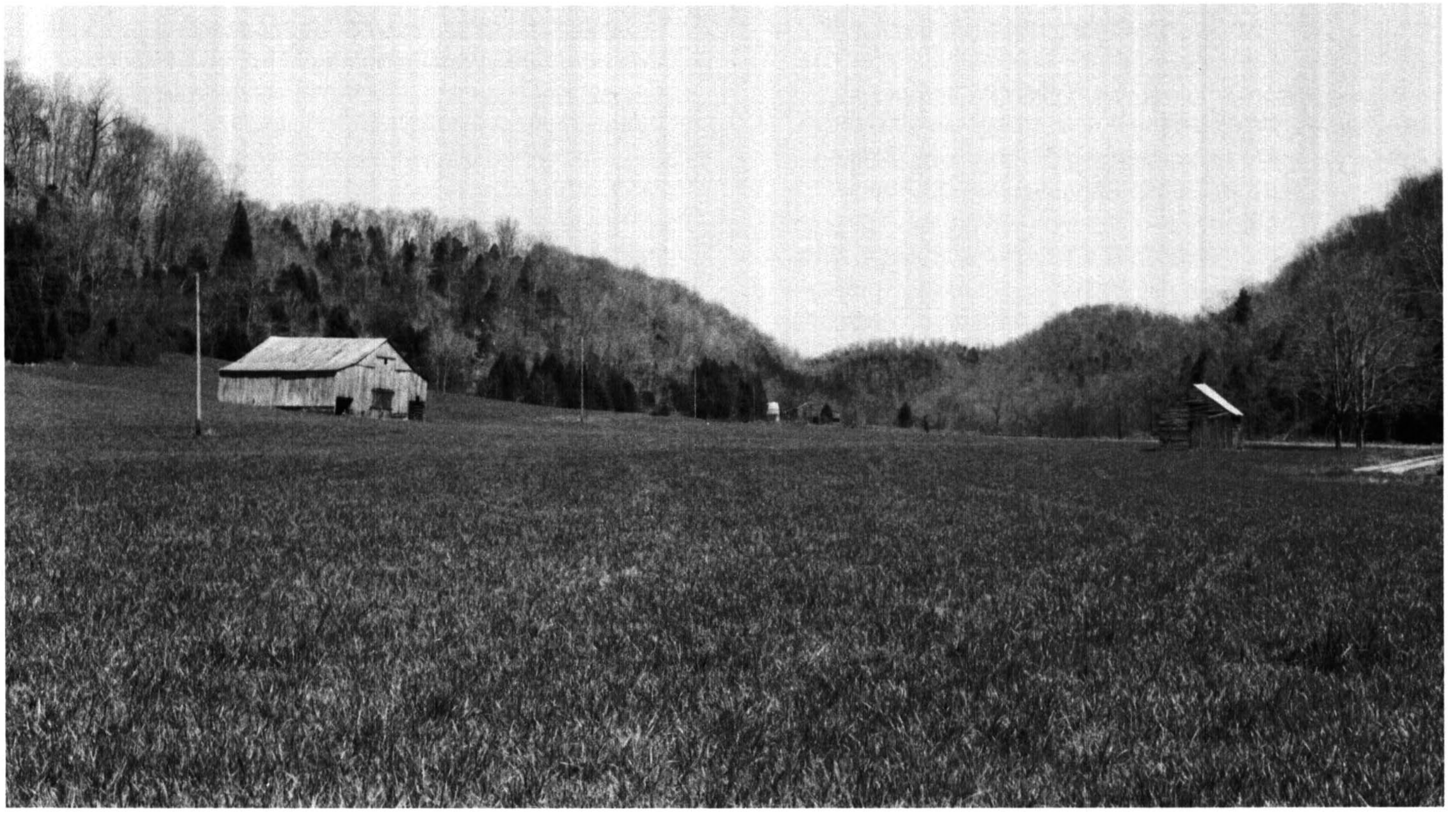

Figure 5.—On the right, a tobacco barn and hayfield in an area of Chagrin loam, occasionally flooded. Renox gravelly loam, 6 to 12 percent slopes, eroded, is on the foot slope near the barn on the left. Garman-Carpenter-Newburn complex, rocky, 30 to 65 percent slopes, is on the hillsides.

size that they could not be separated at the scale used for mapping. The intricate soil patterns are influenced mainly by limestone. Depth to bedrock varies within short distances. Rock outcrop is scattered throughout the unit.

The Cynthiana and similar soils make up about 40 percent of this map unit. The Faywood and similar soils make up about 30 percent. Rock outcrop makes up about 15 percent. The rest was mapped as inclusions.

Typically, the Cynthiana soil has a surface layer of yellowish brown silty clay loam about 5 inches thick. The subsoil extends to a depth of 18 inches. In the upper part, to a depth of 12 inches, it is yellowish brown clay. In the lower part it is yellowish brown gravelly silty clay. Below that is hard limestone.

The Cynthiana soil is low in organic matter content. Permeability is moderately slow. Available water capacity is low. Surface runoff is rapid or very rapid. The root zone is shallow. Shrink-swell potential in the subsoil is moderate. Depth to bedrock is 10 to 20 inches.

Typically, the Faywood soil has a surface layer of dark yellowish brown silty clay loam about 6 inches thick. The subsoil extends to a depth of 30 inches. It is yellowish brown flaggy clay. Below this is hard limestone.

The Faywood soil is low in organic matter content. Permeability is moderately slow or slow. Available water capacity is moderate. Surface runoff is rapid or very rapid. This soil is somewhat difficult to till. The optimum moisture range for cultivation has been reduced because the clayey subsoil has been mixed with the surface layer. The root zone is moderately deep. Shrink-swell potential is moderate. Depth to bedrock is 20 to 40 inches.

Rock outcrop supports little or no vegetation. It consists of areas of exposed limestone on ridges and knolls or in narrow bands on the steeper slopes. Along the Cumberland River, Crocus Creek, and Marrowbone Creek, exposed vertical limestone bluffs range in height from 10 to 200 feet.

Included with this complex in mapping are small areas of loamy or clayey soils less than 10 inches deep over bedrock. A few cleared areas of severely eroded soils and some areas of intermingled Lowell soils are also included. The included areas make up about 15 percent of this map unit. Most areas are less than 3 acres.

In most areas these soils are used for woodland or pasture.

These soils are not suited to row crops. Slope, rock outcrop, and depth to bedrock are limitations.

These soils are poorly suited to hay and pasture.

Slope, rock outcrop, and depth to bedrock are major limitations.

These soils are suited to woodland. Eastern redcedar, American elm, and honey locust are common. Eastern white pine and Virginia pine are preferred for planting on these soils. Management concerns are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. Erosion is a hazard on roads and trails. Erosion can be controlled by laying out roads on or near the contour and by protecting permanent access roads with water bars and gravel. Slope generally limits only large, specialized harvesting and planting equipment. Slopes are generally broken enough so that small tractors, skidders, and dozers as well as trucks can be used for harvesting and planting. On long, steep slopes, logs can be skidded to yards located in less sloping areas and planting can be done by hand. Seedling mortality can be high because of low or very low available water capacity. Reinforcement plantings can be made until a desired stand is obtained. Undesirable plants can be controlled by using herbicides or cutting.

These soils are poorly suited to urban use. Slope, depth to bedrock, rock outcrop, slow permeability, high clay content, and low strength are limitations.

The Cynthiana and Faywood soils are in capability subclass VIIe. Rock outcrop is in capability subclass VIIIs.

DeB—Dewey loam, 2 to 6 percent slopes

This is a very deep, well drained, gently sloping soil on broad, smooth ridgetops on uplands. Some areas of this soil are karst. Most areas of this soil are long and narrow or roughly oval in shape and range from about 3 to 35 acres.

Typically, the surface layer is dark yellowish brown loam about 10 inches thick. The subsoil extends to a depth of 79 inches or more. In the upper part, to a depth of 51 inches, it is red and dark red clay that has brown mottles. In the lower part it is red and strong brown mottled clay.

This soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots. Shrink-swell potential in the subsoil is moderate.

Included with this Dewey soil in mapping, on similar landscapes, are small areas of Caneyville, Crider, Lonewood, and Trimble soils. Also included are small areas of eroded Dewey soils. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, or row crops. Some areas are used for homesites and gardens.

This soil is well suited to all common row crops and garden crops. If properly managed, intensive cropping can be used. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a moderate hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Red oak, black oak, and yellow-poplar are common. Yellow-poplar, eastern white pine, and loblolly pine are preferred for planting on this soil. Equipment limitation and plant competition are management concerns when establishing a new forest crop.

This soil is suited to most urban uses. The clayey subsoil, moderate permeability, and moderate shrinking and swelling are limitations for most building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is in capability subclass IIe.

DeC2—Dewey loam, 6 to 12 percent slopes, eroded

This is a very deep, well drained, sloping soil on narrow, convex ridgetops and side slopes on uplands. Some areas of this soil are karst. Erosion has removed about 25 to 75 percent of the original surface layer. Rills and shallow gullies are common on steeper slopes. Most areas of this soil are long and narrow or irregular in shape and range from about 3 to 560 acres.

Typically, the surface layer is dark yellowish brown loam about 10 inches thick. The subsoil extends to a depth of 79 inches or more. In the upper part, to a depth of 51 inches, it is red and dark red clay that has brown mottles. In the lower part it is red and strong brown mottled clay.

This soil is low in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is medium. This soil is easy to till. The root zone is very deep and is easily penetrated by plant roots. Shrink-swell potential in the subsoil is moderate.

Included with this Dewey soil in mapping, on similar landscapes, are small areas of Caneyville, Lonewood, and

Trimble soils and isolated areas of rock outcrop. Also included are small areas of severely eroded Dewey soils. The included areas make up about 15 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco, corn, soybeans, and some garden crops. A few areas are used for woodland. Some areas are used for homesites and gardens.

This soil is well suited to all common row crops, garden crops, and small grain. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Crop rotation is needed in most areas. Terraces, diversions, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Red oak, black oak, and yellow-poplar are common. Yellow-poplar, eastern white pine, and loblolly pine are preferred for planting on this soil. Equipment limitation and plant competition are management concerns when establishing a new forest crop.

This soil is suited to most urban uses. Slope, clayey subsoil, moderate permeability, and moderate shrinking and swelling are limitations for most building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is in capability subclass IIIe.

DeD2—Dewey loam, 12 to 25 percent slopes, eroded

This is a very deep, well drained, moderately steep and steep soil on ridges and side slopes on uplands. Slopes are convex or linear. Some areas of this soil are karst. Erosion has removed about 25 to 75 percent of the original surface layer. Most areas of this soil are roughly rectangular or irregular in shape and range from about 3 to 115 acres.

Typically, the surface layer is brown loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 12 inches, it is red and dark red clay that has brown mottles. In the lower part it is red and strong brown mottled clay.

This soil is low in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is rapid. This soil is somewhat difficult to till and the moisture range for cultivation has been narrowed because part of the surface layer is subsoil material. The root zone is very deep and is easily penetrated by plant roots. Shrink-swell potential in the subsoil is moderate.

Included with this Dewey soil in mapping, on similar landscapes, are small areas of Caneyville, Lonewood, and Trimble soils and isolated areas of rock outcrop. Also included are small areas of severely eroded Dewey soils. Also included are some areas of moderately deep soils that have a loamy subsoil. The included areas make up about 15 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, or woodland. A few areas are used for row crops or small grain.

This soil is suited to occasional row crops but is better suited to pasture and hay. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Long-term crop rotation is needed. Diversions, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland. Red oak, black oak, and yellow-poplar are common. Yellow-poplar, eastern white pine, and loblolly pine are preferred for planting on this soil. The main management concerns are the erosion hazard, the equipment limitation, and plant competition. Erosion is a hazard generally on roads and trails. Erosion can be controlled by laying out roads on or near the contour and by protecting permanent access roads with water bars, culverts, and gravel. Slope generally limits only large, specialized harvesting and planting equipment. Slopes are generally broken enough so that small tractors, skidders, dozers, and trucks can be used for harvesting and planting. On long steep slopes, logs can be skidded to yards located in less sloping areas and planting can be done by hand. When establishing a new forest crop, plant competition can be a problem because of favorable site conditions. Undesirable plants can be controlled by using herbicides or cutting.

This soil is poorly suited to most urban uses. Slope, clayey subsoil texture, moderate permeability, and moderate shrinking and swelling are limitations for most building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is in capability subclass IVe.

DmD—Dewey-Lonewood complex, 12 to 25 percent slopes

This complex consists of deep and very deep, well drained soils. It is on moderately steep and steep convex ridgetops that divide intermittent drainageways and streams. Mapped areas range from about 5 to 810 acres. The Dewey and Lonewood soils are in areas so intricately mixed or so small that they could not be separated at the scale used in mapping. The intricate soil patterns are influenced mainly by depth to siltstone, sandstone, and limestone and by the clayey subsoil. Depth to bedrock varies within short distances.

The Dewey and similar soils make up about 60 percent of this map unit. The Lonewood and similar soils make up about 20 percent. The rest was mapped as inclusions.

Typically, the Dewey soil has a surface layer of dark yellowish brown loam about 10 inches thick. The subsoil extends to a depth of 79 inches or more. In the upper part, to a depth of 51 inches, it is red and dark red clay that has brown mottles. In the lower part it is red and strong brown, mottled clay.

The Dewey soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is rapid. This soil is easy to till. The root zone is very deep and is easily penetrated by plant roots. Shrink-swell potential in the subsoil is moderate.

Typically, the Lonewood soil has a surface layer of brown silt loam about 7 inches thick. The subsurface layer, to a depth of 14 inches, is light yellowish brown silt loam. The subsoil extends to a depth of 46 inches. In the upper part, to a depth of 20 inches, it is yellowish brown loam. In the middle part, to a depth of 34 inches, it is strong brown and yellowish red clay and clay loam. In the lower part it is mottled yellowish red, brownish yellow, and yellowish brown gravelly sandy loam. The substratum, to a depth of 59 inches, is brownish yellow gravelly sandy loam. Soft sandstone extends to a depth of 71 inches.

The Lonewood soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is rapid. The root zone is deep and very deep. Depth to bedrock is 40 to 72 inches or more.

Included with these soils in mapping, on similar landscapes, are small areas of Garmon and Newbern soils. Also included, in the southern part of the county, are areas of deep and very deep, clayey soils that have slow permeability. Also included are a few areas of rock outcrop. The included areas make up about 20 percent of this map unit.

In most areas these soils are woodland. In a few areas they are used for hay and pasture.

In most areas these soils are not suited to cultivated crops. Erosion is a hazard and slope is a limitation.

These soils are suited to hay and pasture. All common grasses and legumes grow well on these soils. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

These soils are suited to woodland. Upland oaks, yellow-poplar, and hickory are common. Some trees preferred for planting on these soils are loblolly pine and eastern white pine. Management concerns are the erosion hazard, the equipment limitation, and plant competition. Erosion is a hazard generally on roads and trails. Erosion can be controlled by laying out roads on or near the contour and by protecting permanent access roads with water bars, culverts, and gravel. Slope generally limits only large, specialized harvesting and planting equipment. Slopes are generally broken enough so that small tractors, skidders, dozers, and trucks can be used for harvesting and planting. On long, steep slopes, logs can be skidded to yards located in less sloping areas and planting can be done by hand. When establishing a new forest crop, plant competition can be a problem because of favorable site conditions. Undesirable plants can be controlled by using herbicides or cutting.

These soils are poorly suited to most urban uses. Slope, depth to bedrock, moderate permeability, and clayey subsoil are limitations for most building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome these limitations.

The Dewey and Lonewood soils are in capability subclass IVe.

Eg—Egam silty clay loam, rarely flooded

This is a very deep, moderately well drained or well drained, nearly level and gently sloping soil on flood plains of streams, in depressions on flood plains, and around drainageways. Most areas of this soil are long and narrow or roughly rectangular in shape and range from about 3 to 40 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer is very dark grayish brown silty clay loam about 9 inches thick. The subsoil extends to a depth of 64 inches or more. In the upper part, to a depth of 16 inches, it is very dark grayish brown silty clay. In the middle part, to a depth of 50 inches, it is mottled very dark grayish brown and dark yellowish brown clay. In the lower part it is dark yellowish brown clay that has dark grayish brown mottles.

This soil is moderate in organic matter content. Permeability is moderately slow. Available water capacity is high. Surface runoff is slow. This soil is somewhat difficult to till and the moisture range for cultivation is narrower than in most other soils in the survey area. The root zone is very deep and is easily penetrated by plant roots. Shrink-swell potential is moderate. In most years, the surface has cracks ranging from one-half to 2 inches wide. A seasonal high water table is at a depth of 36 to 48 inches in late winter and spring. In most areas the soil is subject to rare flooding in late winter and spring for very brief durations. In some areas the soil is subject to deposition caused by runoff from adjacent slopes.

Included with this Egam soil in mapping, on similar landscapes, are small areas of Chagrin, Grigsby, Huntington, Newark, and Sensabaugh soils. Also included, in lower lying areas, are areas of soils that are similar to the Egam soil but that are subject to occasional flooding. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco, corn, soybeans, and some garden crops.

This soil is well suited to most common row crops, garden crops, and small grain. If properly managed, intensive cropping can be used. Management concerns are the seasonal high water table, flooding, the soil tilth, and the soil fertility. In some years, the seasonal high water table can delay planting, limit crop production, or hinder harvesting. In some years small grain and other winter crops can be damaged by flooding. Conservation tillage, cover crops, and lime and fertilizer help to keep the soil in good tilth and to maintain fertility.

This soil is well suited to hay and pasture. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. In some years hay crops can be damaged by flooding in spring. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is suited to woodland, but few areas are used for timber production. Yellow-poplar, red oak, and sweetgum are common. Yellow-poplar, black walnut, and loblolly pine are preferred for planting. Management concerns are the equipment limitation, plant competition, and seedling mortality.

This soil is poorly suited to urban uses. Flooding, the seasonal high water table, and slow permeability of the subsoil are limitations for most sanitary facilities and building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This soil is in capability subclass IIw.

EkA—Elk silt loam, 0 to 2 percent slopes

This is a very deep, well drained, nearly level soil on terraces of the Cumberland River and its major tributaries. Slopes are commonly convex or linear. Most areas of this soil are roughly rectangular and range from about 3 to 80 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 25 inches, it is dark yellowish brown silt loam. In the middle part, to a depth of 43 inches, it is yellowish brown silty clay loam. In the lower part it is strong brown silty clay loam that has yellowish brown mottles.

This soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is slow. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots.

Included with this Elk soil in mapping are small areas of Holston, Lawrence, Monongahela, and Renox soils. Also included are some areas of soils that are similar to the Elk soil but that have a dark brown surface layer. Also included are a few small areas of eroded Elk soils. The included areas make up about 5 to 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco, corn, soybeans, and some garden crops. Some areas are used for homesites and gardens.

This soil is well suited to all common row crops, garden crops, and small grain. If properly managed, intensive cropping can be used. Management concerns are maintaining soil tilth and fertility. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Yellow-poplar, pin oak, and American sycamore are common. Eastern white pine, yellow-poplar, and black walnut are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

This soil is well suited to most urban uses. Moderate permeability is a limitation for some sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome these limitations.

This soil is in capability class I.

EkB—Elk silt loam, 2 to 6 percent slopes

This is a very deep, well drained, gently sloping soil on terraces of the Cumberland River and its major tributaries. Slopes are commonly convex. Most areas of this soil are roughly rectangular and range from about 3 to 125 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 25 inches, it is dark yellowish brown silt loam. In the middle part, to a depth of 43 inches, it is yellowish brown silty clay loam. In the lower part it is strong brown silty clay loam that has yellowish brown mottles.

This soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots.

Included with this Elk soil in mapping are small areas of Holston, Lawrence, Monongahela, and Renox soils. Also included are a few small areas of eroded Elk soils. Also included are some areas of soils that are similar to the Elk soil but that have a dark brown surface layer. The included areas make up about 5 to 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco, corn, soybeans, and some garden crops. Some areas are used for homesites and gardens.

This soil is well suited to all common row crops, garden crops, and small grain. If properly managed, intensive cropping can be used. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a moderate hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Terraces, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but a few areas are used for timber production. Yellow-poplar, pin oak, and American sycamore are common. Eastern white pine, yellow-poplar, and black walnut are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

This soil is well suited to most urban uses. Moderate permeability is a limitation for some sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is in capability subclass IIe.

EkC2—Elk silt loam, 6 to 12 percent slopes, eroded

This is a very deep, well drained, sloping soil on ridges and side slopes of stream terraces on the Cumberland River and its major tributaries. Erosion has removed 25 to 75 percent of the original surface layer. Slopes are commonly convex. Most areas of this soil are roughly rectangular or irregular in shape and range from about 3 to 40 acres.

Typically, the surface layer is dark yellowish brown silt loam about 5 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 24 inches, it is strong brown silty clay loam. In the lower part it is strong brown, mottled silty clay loam.

This soil is low in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots.

Included with this Elk soil in mapping are small areas of Holston, Lawrence, Monongahela, and Renox soils. Also included are a few small areas of severely eroded Elk soils. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are corn, soybeans, tobacco, and some garden crops.

This soil is suited to all common row crops, garden crops, and small grain. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Crop rotation is needed in most areas. Terraces, diversions, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Yellow-poplar, pin oak, and American sycamore are common. Eastern white pine, yellow-poplar, and black walnut are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

This soil is suited to most urban uses. Slope and moderate permeability are limitations for some building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is in capability subclass IIIe.

EkD2—Elk silt loam, 12 to 25 percent slopes, eroded

This is a very deep, well drained, moderately steep and steep soil on side slopes of stream terraces on the Cumberland River and its major tributaries. Erosion has removed about 25 to 75 percent of the original surface layer. Slopes are commonly linear. Most areas of this soil are roughly rectangular or irregular in shape and range from about 3 to 25 acres.

Typically, the surface layer is dark yellowish brown silt loam about 5 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 24 inches, it is strong brown silt loam. In the lower part it is strong brown, mottled silty clay loam.

This soil is low in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is rapid. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots.

Included with this Elk soil in mapping are small areas of Holston, Lowell, and Waynesboro soils. Also included are a few, small areas of severely eroded Elk soils. The included areas make up about 5 to 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay and pasture. A few areas are used for row crops or small grain.

This soil is suited to occasional row crops but is better suited to pasture and hay. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, and contour farming help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Long-term crop rotation is needed. Diversions, field borders, and filter strips also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Yellow-poplar, pin oak, and American sycamore are common. Eastern white pine, yellow-poplar, and black walnut are preferred for planting on this soil. Management concerns are the erosion hazard, the equipment limitation, and plant competition.

This soil is poorly suited to most urban uses. Slope and moderate permeability are limitations for most building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is in capability subclass IVe.

FcC2—Faywood-Cynthiana complex, rocky, 6 to 12 percent slopes, eroded

This complex consists of moderately deep and shallow, well drained and somewhat excessively drained soils. It is on sloping, convex ridgetops. Rock outcrop covers about 0.1 to 2 percent of the surface. Erosion has removed about 25 to 75 percent of the original surface layer. Mapped areas range from about 3 to 45 acres. The intricate soil patterns are influenced mainly by limestone. Depth to bedrock varies within short distances. Rock outcrop is mostly at slope breaks separating ridgetops from side slopes. The Faywood and Cynthiana soils are in areas so intricately mixed or so small that they could not be separated at the scale used in mapping.

The Faywood and similar soils make up about 40 percent of this map unit. The Cynthiana and similar soils make up about 30 percent. The rest was mapped as inclusions.

Typically, the Faywood soil has a surface layer of dark yellowish brown silty clay loam about 6 inches thick. The subsoil extends to a depth of 30 inches. It is yellowish brown flaggy clay. Below this is hard limestone.

The Faywood soil is low in organic matter content. Permeability is moderately slow or slow. Available water capacity is moderate. Surface runoff is medium. This soil is somewhat difficult to till. The optimum moisture range for cultivation has been reduced because the clayey subsoil has been mixed with the surface layer. The root zone is moderately deep. Shrink-swell potential is moderate. Depth to bedrock is 20 to 40 inches.

Typically, the Cynthiana soil has a surface layer of dark yellowish brown silty clay loam about 5 inches thick. The subsoil extends to a depth of 18 inches. In the upper part, to a depth of 12 inches, it is yellowish brown clay. In the lower part it is yellowish brown gravelly silty clay. Below that is hard limestone.

The Cynthiana soil is low in organic matter content. Permeability is moderately slow. Available water capacity is low. Surface runoff is medium. This soil is somewhat difficult to till. The optimum moisture range for cultivation has been reduced because the clayey subsoil has been mixed with the surface layer. In some areas tillage is impractical because of rock outcrops, shallow soil depth, or flagstones in the subsoil. The root zone is shallow. Shrink-swell potential is moderate. Depth to bedrock is 10 to 20 inches.

Included with these soils in mapping, on similar landscapes, are small areas of Lowell soils. Also included are some areas of shallow and moderately deep, loamy soils. Also included are some areas where rock outcrop covers more than 2 percent of the surface. The included areas make up about 30 percent of this map unit. They are generally less than 3 acres.

In most areas these soils are used for pasture and hayland. In a few areas they are woodland.

These soils are generally unsuited to cultivated crops. Rockiness, depth to bedrock, and flagstones in the subsoil are major limitations.

These soils are suited to pasture. Rockiness limits use of these soils as hayland. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping schedule help to maintain a good stand of forage species.

These soils are suited to woodland. Eastern redcedar, upland oak, hickories, and honey locust are common. Some trees preferred for planting are Virginia pine, white oak, and white ash. Management concerns are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. When establishing a new forest crop, sites for planting are best suited where depth to bedrock is more than 20 inches.

These soils are generally unsuited to urban use. Depth to bedrock, rockiness, moderately slow and slow permeability, and the clayey subsoil are limitations for most sanitary facilities and building site development. Low strength and depth to bedrock are limitations for local roads and streets.

The Faywood and Cynthiana soils are in capability subclass VIs.

FcD2—Faywood-Cynthiana complex, rocky, 12 to 25 percent slopes, eroded

This complex consists of moderately deep and shallow, well drained and somewhat excessively drained soils. It is on moderately steep and steep side slopes and convex ridgetops. Rock outcrop covers about 0.1 to 2 percent of the surface. Erosion has removed about 25 to 75 percent of the original surface layer. Mapped areas range from about 3 to 120 acres.

The Faywood and Cynthiana soils are in areas so intricately mixed or so small in size that they could not be separated at the scale used in mapping. The intricate soil patterns are influenced mainly by limestone. Depth to bedrock varies within short distances.

The Faywood and similar soils make up about 40 percent of this map unit. The Cynthiana and similar soils make up about 30 percent. The rest was mapped as inclusions.

Typically, the Faywood soil has a surface layer of dark yellowish brown silty clay loam about 6 inches thick. The subsoil is yellowish brown flaggy clay to a depth of 30 inches. Below that is hard limestone.

The Faywood soil is low in organic matter content. Permeability is moderately slow or slow. Available water capacity is moderate. Surface runoff is rapid. The root zone is moderately deep. Shrink-swell potential is moderate. Depth to bedrock is 20 to 40 inches.

Typically, the Cynthiana soil has a surface layer of dark yellowish brown silty clay loam about 5 inches thick. The subsoil extends to a depth of 18 inches. In the upper part, to a depth of 12 inches, it is yellowish brown clay. In the lower part it is yellowish brown gravelly silty clay loam. Below that is hard limestone.

The Cynthiana soil is low in organic matter content. Permeability is moderately slow. Available water capacity is low. Surface runoff is rapid. The root zone is shallow. Shrink-swell potential is moderate. Depth to bedrock is 10 to 20 inches.

Included with this complex in mapping, on similar landscapes, are small areas of Lowell soils. Also included are some areas of shallow and moderately deep, loamy soils. Also included are some areas of soils where rock outcrop covers more than 2 percent of the surface. The included areas make up about 30 percent of this map unit. They are generally less than 3 acres.

In most areas these soils are used for pasture and hayland. Many cleared areas have reverted to brushy undergrowth. Some areas are woodland.

These soils are poorly suited to cultivated crops. Slope, rockiness, depth to bedrock, and flagstones in the subsoil are major limitations.

These soils are suited to pasture. Rockiness limits use of these soils as hayland. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

These soils are suited to woodland. Eastern redcedar, upland oaks, hickories, and honey locust are common. Some trees preferred for planting are Virginia pine, white oak, and white ash. Management concerns are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. Erosion is a hazard on roads and trails. Erosion can be controlled by laying out roads on or near the contour and by protecting them with water bars, culverts, and gravel. Slope generally limits only large, specialized harvesting and planting equipment. Slopes are generally short or broken enough so that small tractors, skidders, dozers, and trucks can be used for harvesting and planting. Seedling mortality is a limitation generally on the Cynthiana soil and in areas near rock outcrop. When planting, careful selection of sites regarding depth to bedrock is needed. When establishing a new forest crop, undesirable plants can be controlled by using herbicides or cutting.

These soils are poorly suited to urban uses. Slope, depth to bedrock, rockiness, moderately slow and slow permeability, and the clayey subsoil are limitations for most sanitary facilities and building site development. Slope, low strength, and depth to bedrock are limitations for local roads and streets.

The Faywood and Cynthiana soils are in capability subclass VIs.

GcF—Garmon-Carpenter-Newbern complex, rocky, 30 to 65 percent slopes

This complex consists of very steep, shallow to very deep, well drained to excessively drained soils on uplands. The soils are on side slopes dissected by streams and intermittent drainageways. In most areas the upper part of the slope is slightly convex or linear and the lower part is linear or slightly concave. In most areas rock outcrop covers about 0.1 to 2 percent of the surface. Mapped areas range from about 20 to several hundred acres.

The intricate patterns of these soils are influenced mainly by colluvium. Colluvium is soil material that has moved downslope from higher positions on the landscape. The Newbern and Garmon soils are mostly on the upper two-thirds of the slope. The Carpenter soil is mostly on the lower two-thirds of the slope. These soils formed in materials weathered from interbedded calcareous siltstone and shale and from limestone. Some materials have moved downslope from higher positions. The soil patterns are also influenced by the shape and geometric form of the slopes. More colluvium tends to accumulate on small benches or concave slopes, where the soils are deeper. On the steeper, more linear or convex slopes, the soils are shallower.

The Garmon and similar soils make up about 35 percent of this map unit. The Carpenter and similar soils make up about 30 percent. The Newbern and similar soils make up about 25 percent. The rest was mapped as inclusions.

Typically, the Garmon soil has a surface layer of dark brown loam about 3 inches thick. The subsoil extends to a depth of 24 inches. In the upper part, to a depth of 15 inches, it is dark yellowish brown channery silt loam. In the lower part it is yellowish brown channery silt loam. Below that is hard, gray shale and siltstone.

The Garmon soil is moderate in organic matter content. Permeability is moderately rapid. Available water capacity is moderate. Surface runoff is very rapid. The root zone is moderately deep. Depth to bedrock is 20 to 40 inches.

Typically, the Carpenter soil has a surface layer of brown silt loam about 8 inches thick. The subsurface layer, to a depth of 13 inches, is dark yellowish brown silt loam. The subsoil extends to a depth of 48 inches. In the upper part, to a depth of 27 inches, it is dark yellowish brown silt loam. In the middle part, to a depth of 39 inches, it is yellowish brown channery silty clay loam. In the lower part it is yellowish brown channery silty clay. The substratum is soft siltstone to a depth of 52 inches. Below this is hard siltstone.

The Carpenter soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is very rapid. The root zone is deep or very deep. Shrink-swell potential is moderate. Depth to bedrock is 40 to 80 inches or more.

Typically, the Newbern soil has a surface layer of brown channery silt loam about 2 inches thick. The subsoil extends to a depth of 17 inches. In the upper part, to a depth of 7 inches, it is brown channery silt loam. In the lower part it is yellowish brown channery silt loam. Below that is gray siltstone.

The Newbern soil is low in organic matter content. Permeability is moderate. Available water capacity is low. Surface runoff is very rapid. The root zone is shallow. Depth to bedrock is about 10 to 20 inches.

Included with these soils in mapping, on similar landscapes, are areas of Caneyville, Dewey, and Lonewood soils on the upper part of the slope and a few areas of Renox, Rohan, and Trappist soils on the lower part of the slope. Also included are areas of soils that are more than 35 percent rock fragments. Also included are some areas of soils on narrow ridges that have slope of less than 30 percent. Also included are some areas where rock outcrop covers 2 to 10 percent of the surface. The included areas make up about 10 percent of this map unit.

In most areas these soils are used for woodland. A few cleared areas are used for pasture.

In most areas these soils are not suited to cultivated crops, hay, or pasture. The main limitations are slope, the erosion hazard, and rock outcrop.

These soils are suited to woodland. Yellow-poplar, white oak, and northern red oak are common on cool aspects. Chestnut oak, white oak, and hickories are common on warm aspects. The understory is mainly flowering dogwood, sourwood on the Garmon and Carpenter soils, and eastern redcedar and greenbrier on the Newbern soil. Some trees preferred for planting on cool aspects are yellow-poplar, white ash, and white oak. Some trees preferred for planting on warm aspects are white oak and Virginia pine. Management concerns are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. Erosion is a hazard generally on roads and trails. Erosion can be controlled by laying out roads and trails on or near the contour and by protecting permanent access roads with water bars, culverts, and gravel. Slope generally limits only large, specialized harvesting and planting equipment. Slopes are generally short or broken enough so that small tractors, skidders, and dozers can be used for harvesting and planting. On long steep slopes, logs can be skidded to yards located in less sloping areas and planting can be done by hand. When selecting sites for planting, depth to bedrock and aspect are important considerations. Seedling mortality is a limitation generally on warm aspects and on the Newbern soil. When establishing a new forest crop, plant competition can be a problem. Undesirable plants can be controlled by using herbicides or cutting. An alternative is to establish a new forest crop by managing the existing stand.

These soils are poorly suited to urban uses. Slope and depth to bedrock are the main limitations.

The Garmon, Carpenter, and Newbern soils are in capability subclass VIIe.

Gr—Grigsby fine sandy loam

This is a very deep, well drained, nearly level and gently sloping soil on flood plains and natural levees of the Cumberland River. Most areas of this soil are protected from flooding by Wolf Creek Dam. Areas of this soil are generally rectangular in shape and are bordered on two or three sides by the steep banks of the Cumberland River and its tributaries. A lateral drainageway, roughly parallel to the Cumberland River, generally borders one side. Mapped areas range from about 3 to 80 acres. Slopes range from 0 to 4 percent.

Typically, the surface layer is brown fine sandy loam about 10 inches thick. The subsoil extends to a depth of 34 inches. In the upper part, to a depth of about 18 inches, it is brown fine sandy loam. In the lower part it is dark yellowish brown fine sandy loam. The substratum, to a depth of 62 inches, is dark yellowish brown and yellowish brown loamy fine sand.

This soil is moderate in organic matter content. Permeability is moderate or moderately rapid. Available water capacity is moderate. Surface runoff is slow. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots. This soil may have a seasonal high water table at a depth of 42 to 72 inches.

Included with this Grigsby soil in mapping, on similar landscapes, are small areas of Chagrin, Huntington, Nelse, and Newark soils. Also included are a few areas of soils that are similar to the Grigsby soil but that have more sand or that are dark brown at or near the surface. Also included are areas of soils that are similar to the Grigsby soil but that are subject to rare flooding. Also included, on some small islands in the Cumberland River, are areas of soils that are subject to frequent flooding, generally at lower elevations, and along nearby tributary streams. The included areas make up about 5 to 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco, corn, and soybeans. Some areas are used for homesites and gardens.

This soil is well suited to most common row crops, garden crops, and small grain. If properly managed, intensive cropping can be used. Maintaining soil tilth and fertility is a management concern. Conservation tillage, cover crops, and lime and fertilizer help to maintain soil tilth and fertility.

This soil is well suited to hay and pasture. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland but few areas are used for timber production. Yellow-poplar, red maple, and sweetgum are common. Yellow-poplar, eastern white pine, and white ash are preferred for planting on this soil. The main management concern is plant competition.

This soil is suited to most urban uses.

This soil is in capability class I.

HoB—Holston silt loam, 2 to 6 percent slopes

This is a very deep, well drained, gently sloping soil on terraces of the Cumberland River and its major tributaries. Slopes are commonly convex. Most areas of this soil are roughly rectangular or irregular in shape and range from about 3 to 120 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil extends to a depth of 75 inches or more. In the upper part, to a depth of 26 inches, it is yellowish brown silt loam. In the lower part it is strong brown clay loam.

This soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots.

Included with this Holston soil in mapping are small areas of Elk, Monongahela, Lowell, and Waynesboro soils. Also included are a few small areas of eroded Holston soils. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for row crops, hay, pasture, or small grain. The common row crops are tobacco, corn, and soybeans. Some areas are used for homesites and gardens.

This soil is well suited to all common row crops, garden crops, and small grain. If properly managed, intensive cropping can be used. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a moderate hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Terraces, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland but few areas are used for timber production. Yellow-poplar and red oak are common. Black walnut, red oak, and eastern white pine are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

This soil is suited to most urban uses. The moderate permeability of the subsoil is a limitation for some sanitary facilities. Proper design and installation help to overcome this limitation.

This soil is in capability subclass IIe.

HoC2—Holston silt loam, 6 to 12 percent slopes, eroded

This is a very deep, well drained, sloping soil on ridges and side slopes of stream terraces on the Cumberland River and its major tributaries. Erosion has removed about 25 to 75 percent of the original surface layer. Slopes are commonly convex. Most areas of this soil are roughly rectangular or irregular in shape and range from about 3 to 225 acres.

Typically, the surface layer is dark yellowish brown silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 23 inches, it is brown loam. In the middle part, to a depth of 36 inches, it is brown clay loam. In the lower part it is yellowish red clay loam.

This soil is low in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots.

Included with this Holston soil in mapping are small areas of Elk, Lowell, Monongahela, and Waynesboro soils. Also included are a few areas of severely eroded Holston soils. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco, corn, soybeans, and some garden crops.

This soil is suited to all common row crops, garden crops, and small grain. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Crop rotation is needed in most areas. Terraces, diversions, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland but few areas are used for timber production. Yellow-poplar and red oak are common. Black walnut, red oak, and eastern white pine are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

This soil is suited to most urban uses. Slope and moderate permeability are limitations for some building site development and sanitary facilities. Proper design, installation, and site preparation help to overcome these limitations.

This soil is in capability subclass IIIe.

HsD2—Holston-Waynesboro complex, 12 to 25 percent slopes, eroded

This complex consists of very deep, well drained, moderately steep and steep soils on side slopes on old high stream terraces of the Cumberland River. Erosion has removed about 25 to 75 percent of the original surface layer. Most areas of this soil are roughly rectangular or irregular and range from about 3 to 95 acres.

The Holston and similar soils make up about 50 percent of the complex. The Waynesboro and similar soils make up about 40 percent. The rest was mapped as inclusions.

Typically, the Holston soil has a surface layer of dark yellowish brown silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 23 inches, it is brown loam. In the middle part, to a depth of 36 inches, it is brown clay loam. In the lower part it is yellowish red clay loam.

The Holston soil is low in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is rapid. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots.

Typically, the Waynesboro soil has a surface layer of dark yellowish brown loam about 6 inches thick. The subsoil extends to a depth of 74 inches or more. In the upper part, to a depth of 36 inches, it is strong brown clay. In the middle part, to a depth of 58 inches, it is yellowish red clay loam. In the lower part it is strong brown loam.

The Waynesboro soil is low in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is rapid. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots.

Included with this complex in mapping are small areas of Elk and Monongahela soils. Also included are small areas of severely eroded Waynesboro and Holston soils. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

In most areas these soils are used for hay, pasture, or woodland. In a few areas they are used for row crops.

These soils are suited to occasional row crops but are better suited to pasture and hay. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Long-term crop rotation is needed. Diversions, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

These soils are well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

These soils are well suited to woodland. Red oak, white oak, and yellow-poplar are common. Some trees preferred for planting on cool aspects are yellow-poplar, northern red oak, and eastern white pine. Some trees preferred for planting on warm aspects are shortleaf pine and Virginia pine. Management concerns are the erosion hazard, the equipment limitation, and plant competition. Erosion is a hazard generally on roads and trails. Erosion can be controlled by laying out roads on or near the contour and by protecting permanent access roads with water bars, culverts, and gravel. Slope generally limits only large, specialized harvesting and planting equipment. Slopes are generally broken enough so that small tractors, skidders, dozers, and trucks can be used for harvesting and planting. On long steep slopes, logs can be skidded to yards located in less sloping areas and planting can be done by hand. When establishing a new forest crop, plant competition can be a problem. Undesirable plants can be controlled by using herbicides or cutting.

These soils are poorly suited to most urban uses. Slope, the clayey subsoil, and slow permeability are limitations for most building site development and sanitary facilities. On the Waynesboro soil, low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

The Holston and Waynesboro soils are in capability subclass IVe.

Hu—Huntington silt loam, overwash

This is a very deep, well drained, nearly level soil on flood plains of the Cumberland River. Most areas of this soil are protected from flooding by Wolf Creek Dam. Areas of this soil are generally rectangular in shape and are bordered on two or three sides by the steep banks of the Cumberland River and its tributaries. A lateral drainageway, roughly parallel to the Cumberland River, generally borders one side. Mapped areas range from about 3 to 100 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsurface layer, to a depth of 23 inches, is dark brown silt loam. The subsoil extends to a depth of 75 inches or more. In the upper part, to a depth of 35 inches, it is dark yellowish brown loam. In the middle part, to a depth of 50 inches, it is dark yellowish brown silty clay loam. In the lower part it is dark brown silty clay loam.

This soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is slow. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots.

Included with this Huntington soil in mapping, on similar landscapes, are small areas of Chagrin, Grigsby, Newark, and Stokly soils. Some areas of Newark and Stokly soils are identified by a special wet spot symbol on the soil maps. Also included are areas of soils that are similar to the Huntington soil but that are subject to rare flooding. These soils are generally lower in elevation and along tributary streams nearby. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco, corn, soybeans, and some garden crops. Some areas are used for homesites.

This soil is well suited to all common row crops, garden crops, and small grain. If properly managed, intensive cropping can be used. Maintaining soil tilth and fertility is a management concern. Conservation tillage, cover crops, and lime and fertilizer help to maintain soil tilth and fertility.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Yellow-poplar, red oak, and white oak are common. Yellow-poplar, eastern white pine, and black walnut are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

This soil is suited to most urban uses. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome this limitation.

This soil is in capability class I.

La—Lawrence silt loam, 0 to 4 percent slopes

This is a very deep, somewhat poorly drained, nearly level and gently sloping soil on alluvial fans, on foot slopes, on stream terraces, and in depressions throughout the county. Most slopes are slightly convex or slightly concave. Most areas of this soil are roughly rectangular or oval in shape and range from about 3 to 70 acres.

Typically, the surface layer is yellowish brown silt loam about 8 inches thick. The subsoil extends to a depth of 48 inches. In the upper part, to a depth of 20 inches, it is brownish yellow silty clay loam. In the lower part it is a fragipan of mottled, light brownish gray and strong brown silt loam. The substratum extends to a depth of 68 inches or more. It is mottled, light brownish gray and strong brown silty clay.

This soil is low in organic matter content. Permeability is slow. Available water capacity is moderate. Surface runoff is slow. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is moderately deep and is restricted by the fragipan. A seasonal water table is at a depth of 12 to 24 inches in late winter and spring.

Included with this Lawrence soil in mapping, on similar landscapes, are small areas of Monongahela, Melvin, and Newark soils. Also included are a few areas of soils that are similar to the Lawrence soil but that are subject to ponding or rare flooding. Also included are a few areas of poorly drained soils. The included areas make up about 15 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, or row crops. The common row crops are corn, soybeans, and tobacco.

This soil is suited to such crops as corn and soybeans and some common garden crops. If properly managed, intensive cropping can be used. Management concerns are the seasonal high water table, the moderately deep root zone, the soil tilth, and the soil fertility. Open ditches and drainage tile help to lower the seasonal high water table. In most years, the seasonal high water table can delay planting, limit crop production, or hinder harvesting. Crop species that require a short growing season, tolerate moderate wetness, and do not require a deep root zone are best suited. Conservation tillage, crop residue management, cover crops, and lime and fertilizer help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth and fertility. Grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is suited to hay and pasture. Species tolerant of moderate wetness are best suited. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is suited to woodland, but few areas are used for timber production. Yellow-poplar, sweetgum, and American beech are common. Yellow-poplar, green ash, and American sycamore are preferred for planting on this soil. Management concerns are the equipment limitation, seedling mortality, and plant competition.

This soil is poorly suited to most urban uses. The seasonal high water table and slow permeability in the fragipan are limitations for most building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome these limitations.

This soil is in capability subclass IIIw.

LdB—Lonewood silt loam, 2 to 6 percent slopes

This is a deep and very deep, well drained, gently sloping soil on smooth ridges and plateaus on uplands. Many areas of this soil have sinkholes or depressions. Slopes are commonly convex or linear. Most areas of this soil are roughly oval or irregular in shape and range from about 3 to 55 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil extends to a depth of 60 inches. In the upper part, to a depth of 25 inches, it is yellowish brown silt loam. In the middle part, to a depth of 45 inches, it is yellowish brown and strong brown loam. In the lower part it is yellowish red clay loam.

This soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is deep or very deep and is easily penetrated by plant roots.

Included with this Lonewood soil in mapping, on similar landscapes, are small areas of Caneyville and Dewey soils. Also included are a few areas of soils that are similar to the Lonewood soil but that are redder in the upper part of the subsoil or that have a loam surface layer. Also included are a few isolated areas of soils where sandstone is at a depth of 20 to 40 inches. The included areas make up about 10 to 15 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco and corn. Some areas are used for homesites and gardens.

This soil is well suited to all common row crops, garden crops, and small grain. If properly managed, intensive cropping can be used. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a moderate hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Terraces, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland but few areas are used for timber production. White oak, black oak, and Virginia pine are common. Loblolly pine, shortleaf pine, and eastern white pine are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

This soil is well suited to most urban uses. Moderate permeability and depth to bedrock can be limitations for some building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is capability subclass IIe.

LdC2—Lonewood silt loam, 6 to 12 percent slopes, eroded

This is a deep and very deep, well drained, sloping soil on ridges, side slopes, and rolling benches and plateaus on uplands. Many areas of this soil have sinkholes or depressions. Erosion has removed about 25 to 75 percent of the original surface layer. Slopes are commonly convex. Most areas of this soil are roughly oval or irregular in shape and range from about 3 to 200 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsurface layer, to a depth of 14 inches, is light yellowish brown silt loam. The subsoil extends to a depth of 46 inches. In the upper part, to a depth of 20 inches, it is yellowish brown silt loam. In the middle part, to a depth of 34 inches, it is strong brown and yellowish red clay and clay loam. In the lower part it is mottled yellowish red, brownish yellow, and yellowish brown gravelly sandy loam. The substratum, to a depth of 59 inches, is brownish yellow gravelly sandy loam. Below that is soft sandstone that extends to a depth of 71 inches.

This soil is low in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is deep or very deep and is easily penetrated by plant roots.

Included with this Lonewood soil in mapping, on similar landscapes, are small areas of Caneyville and Dewey soils. Also included are a few areas of soils that are similar to the Lonewood soil but that are redder in the upper part of the subsoil or that have a surface layer of loam. Also included are a few isolated areas of soils where sandstone is at a depth of 20 to 40 inches. Also included are areas of soils on some small ridges and benches of lesser slope. The included areas make up about 15 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco, corn, and soybeans (fig. 6). Some areas are woodland. Some areas are used for homesites and gardens.

This soil is suited to all common row crops, garden crops, and small grain. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Crop rotation is needed in most areas. Terraces, diversions, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland. White oak, black oak, and Virginia pine are common. Loblolly pine, shortleaf pine, and eastern white pine are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

This soil is suited to most urban uses. Slope, moderate permeability, and depth to bedrock can be limitations for some building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is capability subclass IIIe.

LoB—Lowell silt loam, 2 to 6 percent slopes

This is a deep and very deep, well drained, gently sloping soil on broad, smooth ridges on uplands. Slopes are commonly convex or linear. Most areas of this soil are long and narrow or roughly oval in shape and range from about 3 to 30 acres.

Typically, the surface layer is dark yellowish brown silt loam about 10 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 26 inches, it is strong brown silty clay loam. In the lower part it is yellowish brown clay and silty clay.

This soil is moderate in organic matter content. Permeability is moderately slow. Available water capacity is high. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is deep and very deep and is easily penetrated by plant roots. Shrink-swell potential is moderate. Depth to bedrock is 40 inches to more than 80 inches.

Included with this Lowell soil in mapping, on similar landscapes, are small areas of Cynthiana, Elk, and Faywood soils. Also included are areas of soils that are similar to the Lowell soil but that have less clay in the upper part of the subsoil. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco, corn, soybeans, and some garden crops. Some areas are used for homesites.

This soil is well suited to all common row crops, garden crops, and small grain. If properly managed, intensive cropping can be used. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a moderate hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Terraces, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Upland oaks and hickory are common. White ash, eastern white pine, and white oak are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

This soil is suited to most urban uses. The clayey subsoil, moderately slow permeability, and moderate shrinking and swelling are limitations for most building site development and sanitary facilities. Depth to bedrock can be a limitation for dwellings with basements. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is in capability subclass IIe.

LoC2—Lowell silt loam, 6 to 12 percent slopes, eroded

This is a deep and very deep, well drained, sloping soil on narrow convex ridgetops, side slopes, and foot slopes on uplands. Erosion has removed about 25 to 75 percent of the original surface layer. Most areas of this soil are long and narrow or irregular in shape and range from about 3 to 70 acres.

Typically, the surface layer is dark yellowish brown silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 47 inches, it is strong brown clay. In the lower part it is strong brown, mottled silty clay loam.

This soil is low in organic matter content. Permeability is moderately slow. Available water capacity is high. Surface runoff is medium. This soil is somewhat difficult to till and the moisture range for cultivation has been narrowed because part of the surface layer is subsoil material. The root zone is deep and very deep and is easily penetrated by plant roots. Shrink-swell potential is moderate. Depth to bedrock is 40 to 80 inches.

Included with this Lowell soil in mapping, on similar landscapes, are small areas of Cynthiana, Elk, Faywood, and Renox soils. Also included are small areas of soils that are similar to this Lowell soil but that have a gravelly or cobbly surface layer or that have less clay in the upper part of the subsoil. Also included are some areas of severely eroded Lowell soils. The included areas make up about 15 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco, corn, and soybeans. Some areas of this soil are used for homesites and gardens.

This soil is suited to all common row crops, garden crops, and small grain. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Crop rotation is needed in most areas. Terraces, diversions, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management

Figure 6.—Tobacco planted in contour strips. The soil is Lonewood silt loam, 6 to 12 percent slopes, eroded.

concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Upland oaks, black locust, and sugar maple are common. White ash, eastern white pine, and white oak are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

This soil is suited to most urban uses. Slope, the clayey subsoil, moderately slow permeability, and moderate shrinking and swelling are limitations for most building site development and sanitary facilities. In some areas depth to bedrock is a limitation for dwellings with basements. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is in capability subclass IIIe.

LoD2—Lowell silt loam, 12 to 25 percent slopes, eroded

This is a deep and very deep, well drained, moderately steep and steep soil on side slopes on uplands. Slopes are convex or linear. Some areas of this soil are karst. Erosion has removed about 25 to 75 percent of the original surface layer. Most areas of this soil are roughly rectangular or irregular in shape and range from about 3 to 110 acres.

Typically, the surface layer is dark yellowish brown silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 47 inches, it is strong brown clay. In the lower part it is strong brown, mottled silty clay loam.

This soil is low in organic matter content. Permeability is moderately slow. Available water capacity is high. Surface runoff is rapid. This soil is somewhat difficult to till and the moisture range for cultivation has been narrowed because part of the surface layer is subsoil material. The root zone is deep and very deep and is easily penetrated by plant roots. Shrink-swell potential is moderate. Depth to bedrock is 40 to 80 inches.

Included with this Lowell soil in mapping, on similar landscapes, are small areas of Cynthiana and Faywood soil and isolated areas of rock outcrop. Also included are some areas of soils that are similar to this Lowell soil but that have less clay in the upper part of the subsoil or that have a gravelly or cobbly surface layer. Also included are some areas of severely eroded Lowell soils. The included areas make up about 15 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, or woodland. A few areas are used for row crops or small grain. This soil is suited to occasional row crops but is better suited to pasture and hay. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Long-term crop rotation is needed. Diversions, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Upland oaks, hickory, and black locust are common. White ash, eastern white pine, and white oak are preferred for planting on this soil. Management concerns are the erosion hazard, the equipment limitation, and plant competition.

The soil is poorly suited to most urban uses. Slope, clayey subsoil, moderately slow permeability, and moderate shrinking and swelling are limitations for most building site development and sanitary facilities. In some areas depth to bedrock is a limitation for dwellings with basements. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is in capability subclass IVe.

Me—Melvin silt loam, occasionally flooded

This is a very deep, poorly drained, nearly level soil on flood plains, along drainageways, and in depressions on flood plains, stream terraces, and uplands throughout the county. Most areas of this soil are long and narrow or roughly oval in shape. Areas of this soil range from about 3 to 90 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil extends to a depth of 36 inches. It is light olive gray silt loam that has yellowish brown mottles and black stains. The substratum extends to a depth of 60 inches or more. It is gray silty clay loam that has yellowish brown mottles and black stains.

This soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is very slow. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots. A seasonal high water table is at a depth of 12 inches or less in late winter and spring. In most areas the soil is subject to occasional flooding of very brief duration in late winter and spring about once in 2 to 20 years. In some areas the soil is subject to scour and deposition caused by streambank overflow and runoff from adjacent slopes.

Included with this Melvin soil in mapping, on similar landscapes, are small areas of Chagrin, Huntington, Newark, and Stokly soils. The included areas make up about 5 to 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, or row crops. Some areas are used for woodland.

This soil is poorly suited to most common row crops, garden crops, and small grain. Management concerns are the seasonal high water table, flooding, the soil tilth, and the soil fertility. Open ditches and drainage tile help to lower the seasonal high water table. Even if artificially drained, in most years the seasonal high water table will delay planting, limit crop production, or hinder harvesting. Crop species that require a short growing season and tolerate wetness are best suited. In some years small grain and other winter crops can be damaged by flooding or ponding. Conservation tillage, cover crops, and lime and fertilizer help to maintain soil tilth and fertility.

This soil is suited to hay and pasture. Species that are tolerant of wet soils and occasional flooding are best suited. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. In some years hay crops can be damaged by flooding in spring. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is suited to woodland. Sweetgum, pin oak, and willow are common. Green ash and sweetgum are preferred for planting on this soil. Management concerns are the equipment limitation, plant competition, and seedling mortality. Excessive rutting or miring can occur when the soil is wet. Use of equipment can be delayed until the soil is dry and gravel or other suitable material can be added to the main roads to help reduce rutting or miring. In places, roads can be located on soils nearby that are better suited for roads. When establishing a new forest crop, plant competition can be a problem on favorable sites. Undesirable plants can be controlled by cultivation or use of herbicides. In some places seedling mortality is high because of standing water. Reinforcement plantings can be made until a desired stand is obtained or the seedlings can be planted in beds.

This soil is poorly suited to urban uses. Flooding and the seasonal high water table are limitations for most sanitary facilities and building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This soil is in capability subclass IIIw.

MnB—Monongahela silt loam, 2 to 6 percent slopes

This is a very deep, moderately well drained, gently sloping soil on stream terraces of the Cumberland River and its major tributaries. Slopes are commonly convex or linear. Most areas of this soil are roughly rectangular in shape and range from about 3 to 80 acres.

Typically, the surface layer is brown silt loam about 11 inches thick. The subsoil extends to a depth of 83 inches or more. In the upper part, to a depth of 22 inches, it is yellowish brown loam. In the middle part, to a depth of 53 inches, it is a firm, brittle fragipan of brownish yellow loam and sandy clay loam that has gray mottles. In the lower part it is a firm, brittle fragipan of brown and yellowish brown fine sandy loam that has gray mottles.

This soil is moderate in organic matter content. Permeability is moderately slow or slow. Available water capacity is moderate. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is moderately deep and is restricted by the fragipan. A seasonal water table is at a depth of 18 to 36 inches.

Included with this Monongahela soil in mapping are small areas of Elk, Holston, and Lawrence soils. Also included are areas of soils that are similar to the Monongahela soil but that have less sand. Also included are a few small areas of eroded Monongahela soils. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are corn, soybeans, tobacco, and some garden crops.

This soil is suited to most common row crops. If properly managed, intensive cropping can be used. Management concerns are the seasonal high water table, the moderately deep root zone, the erosion hazard, the soil tilth, and the soil fertility. Crops that tolerate moderate wetness and the moderately deep root zone are best suited. Erosion is a moderate hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Terraces, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is suited to hay and pasture. Species tolerant of moderate wetness and the moderately deep root zone are best suited. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Yellow-poplar, red oak, and white ash are common. Eastern white pine, yellow-poplar, and white oak are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

This soil is suited to some urban uses. The seasonal high water table and moderately slow and slow permeability in the fragipan are limitations for most building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is in capability subclass IIe.

MnC2—Monongahela silt loam, 6 to 12 percent slopes, eroded

This is a very deep, moderately well drained, sloping soil on ridges and side slopes of terraces of the Cumberland River and its major tributaries. Slopes are commonly convex or linear. Most areas of this soil are roughly rectangular in shape and range from about 3 to 30 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 12 inches, it is yellowish brown silt loam. In the middle part, to a depth of 32 inches, it is a firm, brittle fragipan of brownish yellow clay loam that has gray mottles. In the lower part it is a firm, brittle fragipan of strong brown loam that has gray mottles.

This soil is moderate in organic matter content. Permeability is moderate above the fragipan and moderately slow or slow in the fragipan. Available water capacity is moderate. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is moderately deep and is restricted by the fragipan. A seasonal water table is at a depth of 18 to 36 inches.

Included with this Monongahela soil in mapping are small areas of Elk, Holston, and Lawrence soils. Also included are a few small areas of severely eroded soils. Also included are some areas of soils that are similar to the Monongahela soil but that have less sand. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are corn, soybeans, and tobacco. Some areas are woodland.

This soil is suited to most common row crops. Management concerns are the erosion hazard, the seasonal high water table, the moderately deep root zone, the soil tilth, and the soil fertility. Crop species that tolerate moderate wetness and the moderately deep root zone are best suited. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Crop rotation is needed. Terraces, diversions, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is suited to hay and pasture. Species tolerant of moderate wetness and the moderately deep root zone are best suited. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland but few areas are used for timber production. Yellow-poplar, red oak, and white ash are common. Eastern white pine, yellow-poplar, and white oak are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

The soil is suited to some urban uses. The seasonal high water table, moderately slow and slow permeability in the fragipan, and slope are limitations for most building site development. Low strength is a severe limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is in capability subclass IIIe.

NeD—Nelse fine sandy loam, 10 to 25 percent slopes, frequently flooded

This is a very deep, well drained, sloping to steep soil on riverbanks of the Cumberland River and near the mouths of its tributaries. On the lower two-thirds of the riverbank, this soil is subject to frequent flooding. Slopes are irregular and are commonly broken by small benches and drainageways. Vertical relief between the protected flood plain and water level ranges from about 15 to 40 feet. Most areas of this soil are long and narrow and range from about 50 to several hundred acres.

Typically, the surface layer is dark brown fine sandy loam about 6 inches thick. The substratum extends to a depth of 62 inches or more. In the upper part, to a depth of 56 inches, it is brown sandy loam. In the lower part it is dark yellowish brown stratified fine sandy loam, silt loam, and silty clay loam.

This soil is moderate in organic matter content. Permeability is moderately rapid or rapid. Available water capacity is moderate. Surface runoff is medium. The root zone is very deep and is easily penetrated by plant roots. This soil is subject to flooding during periods of intensive rainfall and when water is released from Wolf Creek Dam. It is subject to slippage when saturated, excavated, or loaded.

Included with this Nelse soil in mapping, on similar landscapes, are small areas of Chagrin, Grigsby, and Huntington soils. Also included, on about the upper one-third of the slope, are areas of soils that are not subject to flooding. Also included, in steeper areas and on palisades adjoining the riverbank, are a few areas of rock outcrop. Also included are some areas of soils on slopes of more than 25 percent. The included areas make up about 20 percent of this map unit.

In most areas this soil is used for woodland. In the upper one-third of most areas it is used for hay and pasture.

This soil is not suited to crops unless extensive erosion control measures are used. Most areas are too steep to till. Headward erosion is a problem where drainageways intersect the riverbank. Many areas are prone to cave-ins and slippage where streamflow undercuts the riverbank and when the soil is saturated.

This soil is suited to hay and pasture. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland. River birch, American sycamore, and sweetgum are common. Green ash, American sycamore, and sweetgum are preferred for planting on this soil. Management concerns are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. Erosion is a hazard on roads and trails. Erosion can be controlled by locating roads on adjacent soils that have smoother slopes and by winching or cabling logs upslope instead of cutting roads and trails into the steeper slopes. A new forest crop can be established by managing the existing stand or by direct seeding. When establishing a new forest crop, plant competition can be a problem. Undesirable plants can be controlled by using herbicides or cutting.

This soil is poorly suited to urban uses. Flooding and slope are the major limitations for most building site development. In some areas slippage is also a problem.

This soil is in capability subclass VIe.

Nk—Newark silt loam, occasionally flooded

This is a very deep, somewhat poorly drained, nearly level soil on flood plains, along drainageways, and in depressions on flood plains, stream terraces, and uplands throughout the county. Most areas of this soil are long and narrow or roughly oval and range from about 3 to 130 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil extends to a depth of 37 inches. It is olive brown silt loam in the upper part and grayish brown silt loam in the lower part. The substratum extends to a depth of 60 inches or more. It is dark gray loam in the upper part and dark gray silt loam in the lower part.

This soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is slow. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots. A seasonal high water table is at a depth of 6 to 18 inches in late winter and spring. In most areas this soil is subject to occasional flooding of very brief duration in late winter and spring about once in 5 to 50 years. In some areas this soil is subject to scour and deposition caused by streambank overflow and runoff from adjacent slopes. In some areas streambanks are unstable and are subject to undercutting and erosion.

Included with this Newark soil in mapping, on similar landscapes, are small areas of Chagrin, Melvin, Sensabaugh, and Stokly soils. Also included are areas of soils that are similar to the Newark soil but that are subject to rare flooding. These areas are generally higher in elevation than the Newark soil or are adjacent to areas where the stream channel is deeply entrenched. The included areas make up about 5 to 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are corn, soybeans, and some garden crops.

This soil is suited to most common row crops, garden crops, and small grain. If properly managed, intensive cropping can be used. Management concerns are the seasonal high water table, flooding, the soil tilth, and the soil fertility. Open ditches and drainage tile help to lower the seasonal high water table. In most years the seasonal high water table will delay planting, limit crop production, or hinder harvesting. Crop species that require a short growing season and tolerate moderate wetness are best suited. In some years small grain and other winter crops can be damaged by flooding or ponding. Conservation tillage, cover crops, and lime and fertilizer help to maintain soil tilth and fertility.

This soil is suited to hay and pasture. Species that tolerate moderate wetness and occasional flooding are best suited. Management concerns are maintaining adequate fertility and preventing overgrazing. In some years hay crops can be damaged by flooding in spring. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is suited to woodland. Sweetgum, pin oak, and green ash are common. Green ash and sweetgum are preferred for planting on this soil. The equipment limitation, seedling mortality, and plant competition are management concerns when establishing a new forest crop.

This soil is poorly suited to urban uses. Flooding and the seasonal high water table are limitations for most sanitary facilities and building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This soil is in capability subclass IIw.

NrE—Newbern-Garmon complex, very rocky, 12 to 30 percent slopes

This complex consists of moderately steep and steep, shallow and moderately deep, excessively drained to well drained soils and areas where calcareous siltstone, shale, and limestone crop out. In most areas rock outcrop covers about 2 to 10 percent of the surface. These soils and areas of rock outcrop are on convex ridgetops that divide intermittent drainageways and streams. Mapped areas range from about 5 to 730 acres.

The Newbern and Garmon soils are in areas so intricately mixed or so small in size that they could not be separated at the scale used in mapping. The intricate soil patterns are influenced mainly by geologic erosion and bedrock. The Newbern soil and areas of rock outcrop are scattered throughout the complex. The Garmon soil is mainly in areas where ground cover has protected the soil and where weathering of the parent material has been deeper.

The Newbern and similar soils make up about 50 percent of this map unit. The Garmon and similar soils make up about 30 percent. The rest was mapped as inclusions.

Typically, the Newbern soil has a surface layer of brown channery silt loam about 2 inches thick. The subsoil extends to a depth of 17 inches. In the upper part, to a depth of 7 inches, it is brown channery silt loam. In the lower part it is yellowish brown channery silt loam. Below this is hard, gray siltstone.

The Newbern soil is low in organic matter content. Permeability is moderate. Available water capacity is low. Surface runoff is rapid. The root zone is shallow. Bedrock is at a depth of 10 to 20 inches.

Typically, the Garmon soil has a surface layer of dark brown loam about 3 inches thick. The subsoil extends to a depth of 24 inches. In the upper part, to a depth of 15 inches, it is dark yellowish brown channery silt loam. In the lower part it is yellowish brown channery silt loam. Below that is hard, gray shale and siltstone.

The Garmon soil is moderate in organic matter content. Permeability is moderately rapid. Available water capacity is moderate. Surface runoff is rapid. The root zone is moderately deep. Bedrock is at a depth of 20 to 40 inches.

Included with this complex in mapping, on similar landscapes, are small areas of Caneyville, Lonewood, or Renox soils and a few areas of rock outcrop. Also included, near the boundary of the map unit, are a few areas of Rohan and Trappist soils. Also included are areas of soils that are more than 35 percent rock fragments. The included areas make up about 20 percent of this map unit.

These soils are used mainly as woodland. Some cleared areas have reverted to brushy undergrowth. A few cleared areas are used for hay and pasture.

In most areas these soils are not suited to cultivated crops, hay, or pasture. The main limitations are slope, rock outcrops, the erosion hazard, and the restricted use of equipment.

These soils are suited to woodland. Eastern redcedar, upland oaks, and hickory are common. The understory is mainly eastern redcedar and greenbrier. Some shallow areas are covered with prickly pear cactus. Some of the preferred trees for planting on these soils are Virginia pine and white oak. Management concerns are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. Erosion is a hazard generally on roads and trails. Erosion can be controlled by locating roads and trails on or near the contour and by protecting permanent access roads with water bars, culverts, and gravel. Slope generally limits only large specialized harvesting and planting equipment. Slopes are generally short or broken enough so that small tractors, skidders, and dozers can be used for harvesting and planting. When planting, careful selection of sites regarding depth to bedrock is needed.

These soils are poorly suited to urban uses. Rock outcrop, slope, and depth to bedrock are the main limitations.

The Newbern and Garmon soils are in capability subclass VIIe.

ReC2—Renox gravelly loam, 6 to 12 percent slopes, eroded

This is a very deep, well drained, sloping soil on slightly concave foot slopes and convex alluvial fans at the base of steep hillsides. Erosion has removed about 25 to 75 percent of the original surface layer. Most areas of this soil are long and narrow or roughly pear-shaped and range from about 3 to 90 acres.

Typically, the surface layer is brown gravelly loam about 6 inches thick. The subsoil extends to a depth of 67 inches or more. In the upper part, to a depth of 24 inches, it is dark yellowish brown and brown gravelly loam. In the middle part, to a depth of 36 inches, it is dark yellowish brown clay loam. In the lower part it is dark yellowish brown and yellowish brown loam.

This soil is moderate in organic matter content. Permeability is moderate. Available water content is high. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots.

Included with this Renox soil in mapping are small areas of Elk, Lowell, and Sensabaugh soils. Also included are a few areas of soils where bedrock is at a depth of 20 to 40 inches. Also included are a few areas of soils that are similar to the Renox soil but that have a very gravelly surface layer or that are moderately well drained. The included areas make up about 5 to 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco, corn, and soybeans. Some areas are used for homesites and gardens.

This soil is well suited to all common row crops, garden crops, and small grain. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used.

Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Crop rotation is needed in most areas. Terraces, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland but few areas are used for timber production. Yellow-poplar, white oak, and red oak are common. Black walnut, yellow-poplar, and eastern white pine are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

This soil is well suited to most urban uses. Slope is a limitation for some building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome these limitations.

This soil is in capability subclass IIIe.

ReD2—Renox gravelly loam, 12 to 25 percent slopes, eroded

This is a very deep, well drained, moderately steep and steep soil on slightly concave foot slopes at the base of steep side slopes. Erosion has removed about 25 to 75 percent of the original surface layer. Most areas of this soil are long and narrow or roughly rectangular in shape and range from about 3 to 50 acres.

Typically, the surface layer is brown gravelly loam about 6 inches thick. The subsoil extends to a depth of 67 inches or more. In the upper part, to a depth of 24 inches, it is dark yellowish brown and brown gravelly loam. In the middle part, to a depth of 36 inches, it is dark yellowish brown clay loam. In the lower part it is dark yellowish brown and yellowish brown loam.

This soil is moderate in organic matter content. Permeability is moderate. Available water content is high. Surface runoff is rapid. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots.

Included with this Renox soil in mapping are small areas of Carpenter, Faywood, and Garmon soils. Also included are a few areas of gravelly Renox soils and a few areas of soils that are similar to the Renox soil but that have a very gravelly surface layer. The included areas make up about 15 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, or woodland. A few areas are used for row crops.

This soil is suited to occasional row crops but is better suited to pasture and hay. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Long-term crop rotation is needed. Diversions, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland. Yellow-poplar, white oak, and red oak are common. Black walnut, yellow-poplar, and eastern white pine are preferred for planting on this soil. Management concerns are the equipment limitation and plant competition. Slope generally limits only large, specialized harvesting and planting equipment. Slopes are generally broken enough so that small tractors, skidders, dozers, and trucks can be used for harvesting and planting. On long steep slopes, logs can be skidded to yards located in less sloping areas and planting can be done by hand. When establishing a new forest crop, plant competition can be a problem. Undesirable plants can be controlled by using herbicides or cutting.

This soil is poorly suited to most urban uses. Slope is the major limitation for most building site development. Proper design, installation, and site preparation help to overcome slope.

This soil is in capability subclass IVe.

RfF2—Renox-Faywood complex, 20 to 50 percent slopes, eroded

This complex consists of very deep to moderately deep, well drained soils. It is on steep and very steep, linear or convex side slopes and concave foot slopes. In cleared areas erosion has removed about 25 to 75 percent of the original surface layer. Mapped areas range from about 5 to 220 acres.

The intricate soil patterns are influenced mainly by loamy colluvium. The colluvium has moved downslope and covered clayey, residual soils at varying depths. The

Renox and Faywood soils are in areas so intricately mixed or so small that they could not be separated at the scale used in mapping. The Renox soil is mostly on the lower or more concave foot slopes where more colluvium has accumulated. The Faywood soil is mostly on upper, more linear or convex side slopes.

The Renox and similar soils make up about 50 percent of this map unit. The Faywood and similar soils make up about 30 percent. The rest was mapped as inclusions.

Typically, the Renox soil has a surface layer of brown gravelly loam about 6 inches thick. The subsoil extends to a depth of 67 inches or more. In the upper part, to a depth of 24 inches, it is dark yellowish brown and brown gravelly loam. In the middle part, to a depth of 36 inches, it is dark yellowish brown clay loam. In the lower part it is dark yellowish brown and yellowish brown loam.

The Renox soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is very rapid. The root zone is very deep.

Typically, the Faywood soil has a surface layer of dark yellowish brown silty clay loam about 6 inches thick. The subsoil extends to a depth of 30 inches. It is yellowish brown flaggy clay. Below this is hard limestone.

The Faywood soil is low in organic matter content. Permeability is moderately slow or slow. Available water capacity is moderate. Surface runoff is very rapid. Shrink-swell potential is moderate.

Included with this complex in mapping, on similar landscapes, are small areas of Lowell and Cynthiana soils. Also included are a few areas of rock outcrop and a few areas of severely eroded Renox and Faywood soils. The included areas make up about 20 percent of this map unit. They are generally less than 3 acres.

About half the areas of these soils are used for woodland. The rest is hayland and pasture.

These soils are poorly suited to row crops. Slope is the main limitation.

These soils are suited to pasture on slopes of less than 30 percent. They are poorly suited to hayland because of slope. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping schedule help to maintain a good stand of forage species.

These soils are suited to woodland. Upland oaks and hickory are common. Some trees preferred for planting are yellow-poplar, eastern white pine, and white oak. Management concerns are the erosion hazard, the equipment limitation, and plant competition. Erosion is a hazard on roads and trails. Erosion can be controlled by locating roads on or near the contour and by protecting permanent access roads with water bars, culverts, and gravel. Slope generally limits only large, specialized harvesting and planting equipment. Slopes are generally broken enough so that small tractors, skidders, and dozers can be used for harvesting and planting. On long, steep slopes, logs can be skidded to yards located in less sloping areas and planting can be done by hand. When establishing a new forest crop, plant competition can be a problem. Undesirable plants can be controlled by using herbicides or cutting. A new forest crop can also be established by managing the existing stand.

These soils are generally unsuited to urban uses because of slope.

The Renox and Faywood soils are in capability subclass VIIe.

RoF3—Rohan channery silt loam, 20 to 50 percent slopes, gullied

This is a shallow, well drained, and steep and very steep soil. It is on uplands. Slopes are convex or linear. Shale crops out on about 0.1 to 2 percent of the surface. Gullies 0.5 to 2 feet deep are scattered throughout most areas of this soil. Mapped areas range from about 5 to 685 acres.

Typically, the surface layer is dark brown channery silt loam about 4 inches thick. The subsoil extends to a depth of 18 inches. It is dark yellowish brown very channery silt loam. Soft, black shale extends to a depth of 20 inches. Below that is hard, black shale.

This soil is low in organic matter content. Permeability is moderate or moderately slow. Available water capacity is low. Surface runoff is very rapid. The root zone is shallow. Depth to black shale is 8 to 20 inches.

Included with this Rohan soil in mapping are small areas of loamy or clayey soils where bedrock is at a depth of less than 8 inches. Also included are some areas of soils that are similar to the Rohan soil but that have fewer rock fragments in the subsoil. Also included are a few areas of Trappist soils. The included areas make up about 25 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for woodland or pasture. It is not suited to row crops.

This soil is poorly suited to cultivated crops. Slope, rock outcrop, and shallow soil depths are severe limitations. Erosion is a severe hazard if this soil is cultivated.

This soil is poorly suited to hay and pasture. Slope, rock outcrop, and shallow soil depths are major limitations.

This soil is suited to woodland. Upland oaks and Virginia pine are common. Virginia pine and shortleaf pine are preferred for planting on this soil. Management concerns are the erosion hazard, the equipment limitation, and seedling mortality. Erosion is a hazard on roads and trails. Erosion can be controlled by locating roads on or near the contour and by protecting permanent access roads with water bars and gravel. Slope generally limits only large, specialized harvesting and planting equipment. Slopes are generally broken enough so that small tractors, skidders, bulldozers, and trucks can be used for harvesting and planting. On long, steep slopes, logs can be skidded to yards located in less sloping areas and planting can be done by hand. Seedling mortality can be high because of low available water capacity. Reinforcement plantings can be made until a desired stand is obtained.

This soil is poorly suited to urban uses because of slope, depth to bedrock, rock outcrop, slow permeability, low strength, and small stones.

This soil is in capability subclass VIIe.

Se—Sensabaugh gravelly loam, 0 to 4 percent slopes, occasionally flooded

This is a very deep, well drained, nearly level and gently sloping soil on narrow flood plains and alluvial fans of small streams throughout the county. Areas of this soil are long and narrow or roughly rectangular in shape and range from about 3 to 300 acres.

Typically, the surface layer is brown gravelly loam about 11 inches thick. The subsoil extends to a depth of 55 inches. In the upper part, to a depth of 25 inches, it is dark yellowish brown silt loam. In the middle part, to a depth of 35 inches, it is dark brown gravelly loam. In the lower part it is brown very gravelly sandy loam. The substratum extends to a depth of 79 inches or more. In the upper part, to a depth of 64 inches, it is mottled, dark gray and light olive brown gravelly loam. In the lower part it is light olive brown extremely gravelly sandy clay loam.

This soil is moderate in organic matter content. Permeability is moderate or moderately rapid. Available water capacity is high. Surface runoff is slow. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots. A seasonal high water table is at a depth of 48 to 72 inches in late winter and spring. In most areas this soil is subject to occasional flooding of very brief duration in late winter and spring about once in 5 to 50 years. In some areas it is subject to scour and deposition caused by streambank overflow and runoff from adjacent slopes. In some areas streambanks are unstable and are subject to undercutting and erosion.

Included with this Sensabaugh soil in mapping, on similar landscapes, are small areas of Chagrin, Grigsby, and Newark soils. Also included are areas of soils that are similar to the Sensabaugh soil but that are subject to rare flooding and a few sloping areas of Renox soils. These included areas are generally higher in elevation, near the base of hills, at the mouth of drainageways, or adjacent to areas where the stream channel is deeply entrenched. They make up about 15 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco, corn, soybeans, and some garden crops.

This soil is well suited to most common row crops, garden crops, and small grain (fig. 7). If properly managed, intensive cropping can be used. Management concerns are flooding, the soil tilth, and the soil fertility. In some years small grain and other winter crops can be damaged by flooding. Deep tillage generally is undesirable because the quantity of coarse fragments generally increases with depth. Conservation tillage, cover crops, and lime and fertilizer help to maintain soil tilth and fertility.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. In some years hay crops can be damaged by flooding in spring. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Yellow-poplar and white oak are common. Yellow-poplar, black walnut, and white oak are preferred for planting on this soil. Plant competition and seedling mortality are management concerns when establishing a new forest crop.

This soil is generally unsuited to building site development unless guidelines and restrictions for building on a flood plain are followed.

This soil is in capability subclass IIw.

SgB—Sensabaugh gravelly loam, 2 to 6 percent slopes

This is a very deep, well drained, gently sloping soil on foot slopes, terraces, and convex alluvial fans at the base of steep hillsides. Most areas of this soil are long and narrow or roughly pear-shaped and range from about 3 to 75 acres.

Typically, the surface layer is brown gravelly loam about 11 inches thick. The subsoil extends to a depth of 55 inches. In the upper part, to a depth of 25 inches, it is dark yellowish brown silt loam. In the next part, to a depth of 35 inches, it is dark brown gravelly loam. In the lower part it is brown very gravelly sandy loam. The substratum extends to a depth of 79 inches or more. In the upper part, to a depth of 64 inches, it is mottled, dark gray and light olive brown gravelly loam. In the lower part it is light olive brown extremely gravelly sandy clay loam.

This soil is moderate in organic matter content. Permeability is moderate or moderately rapid. Available water capacity is high. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots.

Included with this Sensabaugh soil in mapping are small areas of Elk, Holston, Lowell, and Renox soils. Also included, along narrow drainageways, at the intersection of streams, and near streambanks, are a few areas of soils that are similar to the Sensabaugh soil but that have more rock fragments. Also included are some areas of soils that are similar to the Sensabaugh soil but that are subject to rare flooding. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, or row crops. The common row crops are tobacco, corn, and soybeans. Some areas of this soil are used for homesites and gardens.

This soil is well suited to all common row crops, garden crops, and small grain. If properly managed, intensive cropping can be used. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a moderate hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Terraces, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. Most common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotations, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Yellow-poplar and white oak are common. Black walnut, yellow-poplar, and white oak are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

This soil is suited to most urban uses. Rare flooding is a limitation in some areas.

This soil is in capability subclass IIe.

St—Stokly sandy loam, occasionally flooded

This is a very deep, somewhat poorly drained, nearly level soil on flood plains, along drainageways, and in depressions on flood plains, stream terraces, and uplands throughout the county. Most areas are long and narrow or roughly oval and range from about 3 to 55 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown sandy loam about 7 inches thick. The subsoil extends to a depth of 38 inches. It is light olive brown sandy loam in the upper part and grayish brown sandy loam in the lower part. The substratum extends to a depth of 60 inches or more. It is grayish brown loamy sand that has yellowish brown mottles in the upper part. It is mottled grayish brown, light grayish brown, and yellowish brown loamy sand in the lower part.

This soil is low in organic matter content. Permeability is moderately rapid. Available water capacity is moderate. Surface runoff is slow. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is very deep and is easily penetrated by plant roots. A seasonal high water table is at a depth of 6 to 12 inches in late winter and spring. In most areas this soil is subject to occasional flooding of very brief duration in late winter and spring once in 5 to 50 years. In some areas it is subject to scour and deposition caused by streambank overflow and runoff from adjacent slopes. In some areas streambanks are unstable and are subject to undercutting and erosion.

Included with this Stokly soil in mapping, on similar landscapes, are small areas of Chagrin, Melvin, and Newark soils. Also included are some areas of soils that are similar to the Stokly soil but that are subject to ponding or rare flooding. These areas are generally higher in elevation or are adjacent to areas where the stream channel is deeply entrenched. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, or row crops. The common row crops are corn, soybeans, and some garden crops.

This soil is suited to most common row crops, garden crops, and small grain. If properly managed, intensive cropping can be used. Management concerns are the seasonal high water table, flooding, the soil tilth, and the soil fertility. Grading the soil into beds and installing open ditches and drainage tile help to lower the seasonal high water table. In most years, the seasonal high water table will delay planting, limit crop production, or hinder harvesting. Crop species that require a short growing season and that tolerate moderate wetness are best suited. In some years small grain and other winter crops can be damaged by flooding or ponding. Conservation tillage, cover crops, and lime and fertilizer help to maintain soil tilth and fertility.

This soil is suited to hay and pasture. Species that tolerate moderate wetness and occasional flooding are best suited. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing

Figure 7.—In the foreground, corn planted in an area of Sensabaugh gravelly loam, 0 to 4 percent slopes, occasionally flooded. The pasture in the background is on Renox gravelly loam, 6 to 12 percent slopes, eroded.

overgrazing. In some years hay crops can be damaged by flooding in spring. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is suited to woodland. Sweetgum, white oak, and yellow-poplar are common. Eastern white pine and American sycamore are preferred for planting on this soil. Management concerns are the equipment limitation, seedling mortality, and plant competition.

This soil is poorly suited to urban uses. Flooding and the seasonal high water table are limitations for most sanitary facilities and building site development.

This soil is in capability subclass IIw.

TeB—Teddy loam, 1 to 6 percent slopes

This is a very deep, moderately well drained, nearly level and gently sloping soil on broad ridges and side slopes on uplands. Slopes are commonly linear or convex. The soil is dominantly in the Smith Grove-String Ridge area of the county. Most areas of this soil are irregular in shape and range from about 3 to 125 acres.

Typically, the surface layer is brown loam about 5 inches thick. The subsurface layer, to a depth of 12 inches, is light yellowish brown loam. The subsoil extends to a depth of 62 inches or more. In the upper part, to a depth of 22 inches, it is light yellowish brown and brownish yellow loam. In the lower part it is a firm, brittle fragipan of brownish yellow loam that has strong brown, light brownish gray, and gray mottles.

This soil is moderate in organic matter content. Permeability is moderate above the fragipan and slow below. Available water capacity is moderate. Surface runoff is medium. This soil is easy to till and can be worked within a wide range of moisture content. The root zone is moderately deep and is restricted by the fragipan. A seasonal high water table is within 24 to 36 inches of the surface.

Included with this Teddy soil in mapping, on similar landscapes, are small areas of Dewey, Lonewood, Newark, and Stokly soils. Also included are some areas of soils that are similar to the Teddy soil but that have bedrock at a depth of less than 60 inches. Also included are some areas of somewhat poorly drained soils. The included areas make up about 10 to 15 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are corn, soybeans, and tobacco. Some areas are wooded.

This soil is suited to most common row crops. If properly managed, intensive cropping can be used. Management concerns are the erosion hazard, the seasonal high water table, the moderately deep root zone, the soil tilth, and the soil fertility. Erosion is a moderate hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Terraces, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration. Crop species that tolerate moderate wetness and the moderately deep root zone are best suited.

This soil is suited to hay and pasture. Species tolerant of moderate wetness and the moderately deep root zone are best suited. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland. Sugar maple, black oak, and red oak are common. Eastern white pine, yellow-poplar, and white oak are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop. Undesirable plants can be controlled by cultivation, cutting, or use of herbicides.

This soil is suited to some urban uses. The seasonal high water table and slow permeability in the fragipan are limitations for most building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome these limitations.

This soil in capability subclass IIe.

ToC2—Trappist silt loam, 6 to 12 percent slopes, eroded

This is a moderately deep, well drained, sloping soil on narrow, convex ridgetops and side slopes on uplands. Erosion has removed about 25 to 75 percent of the original surface layer. Most areas of this soil are roughly oval or irregular in shape and range from about 3 to 15 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil extends to a depth of 22 inches. It is yellowish red clay. The substratum, to a depth of 29 inches, is pale olive clay. Black shale is at a depth of 29 inches.

This soil is low in organic matter content. Permeability is moderately slow. Available water capacity is moderate. Surface runoff is medium. This soil is somewhat difficult to till and the moisture range for cultivation has been narrowed because part of the surface layer is subsoil material. The root zone is moderately deep and is easily penetrated by plant roots. Shrink-swell potential is moderate. Black shale is at a depth of 20 to 40 inches.

Included with this Trappist soil in mapping, on similar landscapes, are small areas of Rohan soils. Also included are small areas of soils that are similar to the Trappist soil but that have a gravelly surface layer. Also included are some areas of severely eroded Trappist soils. Also included are a few areas of shallow, clayey soils. The included areas make up about 15 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for woodland, hay, or pasture. A few areas are used for row crops. Many areas that were once cleared have reverted to brushy undergrowth.

This soil is suited to most common row crops and garden crops. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Crop rotation is needed. Terraces, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland. Virginia pine, white oak, and eastern redcedar are common. Virginia pine and white oak are preferred for planting on this soil. Equipment limitation and plant competition are management concerns when establishing a new forest crop.

The soil is suited to some urban uses. Slope, the clayey subsoil, slow permeability, moderate shrinking and swelling, and depth to bedrock are limitations for some building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome these limitations.

This soil is in capability subclass IIIe.

TpD2—Trappist-Rohan complex, rocky, 12 to 25 percent slopes, eroded

This complex consists of moderately deep and shallow, well drained soils. It is on moderately steep and steep side slopes and convex ridgetops. Erosion has removed about 25 to 75 percent of the original surface layer. Rock outcrop covers about 0.1 to 2 percent of the surface. Mapped areas range from about 3 to 20 acres.

The Trappist and Rohan soils are in areas so intricately mixed or so small that they could not be separated at the scale used in mapping. The intricate soil patterns are influenced mainly by shale. Depth to bedrock varies within short distances. Rock outcrop is scattered throughout this map unit.

The Trappist and similar soils make up about 40 percent of this map unit. The Rohan and similar soils make up about 30 percent. The rest was mapped as inclusions.

Typically, the Trappist soil has a surface layer of strong brown silt loam about 7 inches thick. The subsoil extends to a depth of 22 inches. It is yellowish red clay. The underlying horizon, to a depth of 29 inches, is pale olive clay. Black shale is at a depth of 29 inches.

The Trappist soil is low in organic matter content. Permeability is moderately slow. The availability water capacity is moderate. Surface runoff is rapid. The root zone is moderately deep. Shrink-swell potential is moderate. Black shale is at a depth of 20 to 40 inches.

Typically, the Rohan soil has a surface layer of dark brown channery silt loam about 4 inches thick. The subsoil extends to a depth of 18 inches. It is dark yellowish brown very channery silt loam. Soft, black shale extends to a depth of 20 inches. Below that is hard, black shale.

The Rohan soil is low in organic matter content. Permeability is moderate or moderately slow. Available water capacity is low. Surface runoff is rapid. The root zone is shallow. Depth to black shale is 8 to 20 inches.

Included with this complex in mapping, on similar landscapes, are small areas of moderately deep and deep, loamy soils. Also included are some areas of severely eroded Rohan and Trappist soils. The included areas make up about 30 percent of this map unit. They are generally less than 3 acres in size.

In most areas these soils are used for pasture and hayland. Many cleared areas have reverted to brushy undergrowth. Some areas are woodland.

These soils are poorly suited to row crops. Slope, rockiness, depth to bedrock, and rock fragments in the subsoil are major limitations. Erosion is a severe hazard if these soils are cultivated.

These soils are suited to pasture. Rockiness limits use of these soils for hayland. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping schedule help to maintain a good stand of forage species.

These soils are suited to woodland. Upland oaks, eastern redcedar, and hickory are common. Some trees preferred for planting are Virginia pine and white oak. Management concerns are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. Erosion is a hazard generally on roads and trails. Erosion can be controlled by locating roads on or near the contour and by protecting roads with water bars, culverts, and gravel. Slope generally limits only large, specialized harvesting and planting equipment. Slopes are generally short or broken enough so that small tractors, skidders, dozers, and trucks can be used for harvesting and planting. Seedling mortality is a limitation generally on the Rohan soil and in areas near rock outcrops. When planting, careful selection of sites regarding depth to bedrock is needed.

These soils are poorly suited to urban uses. Slope, depth to bedrock, slow permeability, moderate shrinking and swelling, and the clayey subsoil are limitations for sanitary facilities and building site development. Slope, low strength, and depth to bedrock are limitations for local roads and streets.

The Trappist and Rohan soils are in capability subclass VIs.

TrB—Trimble cobbly silt loam, 2 to 6 percent slopes

This is a very deep, well drained, gently sloping soil on broad, smooth ridgetops and uplands. Some areas of this soil are karst. Most areas of this soil are long and narrow or roughly oval in shape and range from about 3 to 35 acres.

Typically, the surface layer is yellowish brown cobbly silt loam about 10 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 24 inches, it is yellowish red clay loam. In the middle part, to a depth of 34 inches, it is strong brown cobbly clay loam and loam. In the lower part it is reddish yellow cobbly clay loam.

This soil is moderate in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is medium. This soil is somewhat difficult to till because of the content of rock fragments in the surface layer. The root zone is very deep and is easily penetrated by plant roots.

Included with this Trimble soil in mapping, on similar landscapes, are small areas of Caneyville, Dewey, and Lonewood soils. Also included are some areas of Trimble soils. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, or row crops. Some areas are used for homesites and gardens.

This soil is well suited to most common row crops and garden crops. If properly managed, intensive cropping can be used. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a moderate hazard if conventional tillage is used. Conservation tillage including no-till, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Scarlet oak, white oak, and yellow-poplar are common. Eastern white pine and shortleaf pine are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

The soil is suited to most urban uses. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Small stones can be a problem for landscaping and lawns. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is in capability subclass IIe.

TrC2—Trimble cobbly silt loam, 6 to 12 percent slopes, eroded

This is a very deep, well drained, sloping soil on narrow, convex ridgetops and side slopes on uplands. Some areas of this soil are karst. Erosion has removed about 25 to 75 percent of the original surface layer. Most areas of this soil are long and narrow or irregular in shape and range from about 3 to 225 acres.

Typically, the surface layer is dark yellowish brown cobbly silt loam about 8 inches thick. The subsoil extends to a depth of 62 inches. In the upper part, to a depth of 26 inches, it is strong brown cobbly loam. In the middle part, to a depth of 48 inches, it is strong brown cobbly silty clay loam. In the lower part it is reddish yellow cobbly silty clay loam. Below that is hard limestone.

This soil is low in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is medium. This soil is somewhat difficult to till because of the content of rock fragments in the surface layer. The root zone is very deep and is easily penetrated by plant roots.

Included with this Trimble soil in mapping, on similar landscapes, are small areas of Caneyville, Dewey, and Lonewood soils and isolated areas of rock outcrop. Also included are small areas of severely eroded Trimble soils. The included areas make up about 15 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, or row crops. The common row crops are tobacco, corn, and some garden crops. Some areas are idle or woodland. Some areas are used for homesites and gardens.

This soil is suited to all common row crops, garden crops, and small grain. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Crop rotation is needed in most areas. Terraces, diversions, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland. Scarlet oak, white oak, and yellow-poplar are common. Eastern white pine and shortleaf pine are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

The soil is suited to most urban uses. Slope is a limitation for most building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Small stones can be a problem for landscaping and lawns. Proper design, installation, and site preparation help to overcome some of these limitations.

This soil is in capability subclass IIIe.

TrD2—Trimble cobbly silt loam, 12 to 25 percent slopes, eroded

This is a very deep, well drained, moderately steep and steep soil on ridges and side slopes on uplands. Slopes are convex or linear. Some areas of this soil are karst. Erosion has removed about 25 to 75 percent of the original surface layer. Most areas of this soil are roughly rectangular or irregular in shape and range from about 3 to 50 acres.

Typically, the surface layer is dark yellowish brown cobbly silt loam about 8 inches thick. The subsoil extends to a depth of 62 inches. In the upper part, to a depth of 26 inches, it is strong brown cobbly loam. In the middle part, to a depth of 48 inches, it is strong brown cobbly silty clay loam. In the lower part it is reddish yellow cobbly silty clay loam. Below this is hard limestone.

This soil is low in organic matter content. Permeability is moderate. Available water capacity is moderate or high. Surface runoff is rapid. This soil is somewhat difficult to till because of the content of rock fragments in the surface layer. The root zone is very deep and is easily penetrated by plant roots.

Included with this Trimble soil in mapping, on similar landscapes, are small areas of Caneyville and Dewey soils and isolated areas of rock outcrop. Also included are small areas of severely eroded Trimble soils. The included areas make up about 15 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, or woodland. A few areas are used for row crops.

This soil is suited to occasional row crops but is better suited to pasture and hay. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Long-term crop rotation is needed. Diversions, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland. Scarlet oak, white oak, and yellow-poplar are common. Eastern white pine and shortleaf pine are preferred for planting on this soil. Management concerns are the erosion hazard, the equipment limitation, and plant competition.

The soil is poorly suited to most urban uses. Slope is a limitation for most building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Small stones can be a problem for landscaping and lawns. Proper design, installation, and site preparation help to overcome these limitations.

This soil is in capability subclass IVe.

WaC2—Waynesboro loam, 6 to 12 percent slopes, eroded

This is a very deep, well drained, sloping soil on narrow, convex ridgetops and side slopes on high terraces of the Cumberland River. Erosion has removed about 25 to 75 percent of the original surface layer. Most areas of this soil are long and narrow or irregular in shape and range from about 3 to 150 acres.

Typically, the surface layer is dark yellowish brown loam about 6 inches thick. The subsoil extends to a depth of 74 inches or more. In the upper part, to a depth of 36 inches, it is strong brown clay. In the middle part, to a depth of 58 inches, it is yellowish red clay loam. In the lower part it is strong brown loam.

This soil is low in organic matter content. Permeability is moderate. Available water capacity is high. Surface runoff is medium. This soil is somewhat difficult to till and the moisture range for cultivation has been narrowed because part of the surface layer is subsoil material. The root zone is very deep and is easily penetrated by plant roots. Shrink-swell potential is moderate.

Included with this Waynesboro soil in mapping, on similar landscapes, are small areas of Elk, Holston, Lowell, and Monongahela soils. The included areas make up about 10 percent of this map unit. Most areas are less than 3 acres.

Most areas of this soil are used for hay, pasture, row crops, or small grain. The common row crops are tobacco, corn, and soybeans. Some areas used for homesites and gardens.

The soil is suited to all common row crops, garden crops, and small grain. Management concerns are controlling erosion and maintaining soil tilth and fertility. Erosion is a severe hazard if conventional tillage is used. Conservation tillage, crop residue management, contour farming, and cover crops help to reduce runoff, to control erosion, to increase infiltration, and to maintain soil tilth. Crop rotation is needed in most areas. Terraces, diversions, grassed waterways, field borders, and filter strips, in appropriate places, also help to reduce runoff, to control erosion, and to increase infiltration.

This soil is well suited to hay and pasture. All common grasses and legumes grow well on this soil. Management concerns are maintaining fertility, maintaining an adequate stand, and preventing overgrazing. Proper stocking rates, pasture rotation, deferred grazing, and a well planned clipping and harvesting schedule help to maintain a good stand of forage species.

This soil is well suited to woodland, but few areas are used for timber production. Red oak, white oak, and yellow-poplar are common. Yellow-poplar, eastern white pine, and loblolly pine are preferred for planting on this soil. Plant competition is a management concern when establishing a new forest crop.

This soil is suited to most urban uses. Slope, clayey subsoil texture, slow permeability, and moderate shrinking and swelling are limitations for most building site development and sanitary facilities. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material. Proper design, installation, and site preparation help to overcome these limitations.

This soil is in capability subclass IIIe.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed at the end of this section. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

The map units that meet the requirements for prime farmland are:

Cg	Chagrin loam, occasionally flooded
CrB	Crider silt loam, 2 to 6 percent slopes
DeB	Dewey loam, 2 to 6 percent slopes
Eg	Egam silty clay loam, rarely flooded
EkA	Elk silt loam, 0 to 2 percent slopes
EkB	Elk silt loam, 2 to 6 percent slopes
Gr	Grigsby fine sandy loam
HoB	Holston silt loam, 2 to 6 percent slopes
Hu	Huntington silt loam, overwash
La	Lawrence silt loam, 0 to 4 percent slopes (where drained)
LdB	Lonewood silt loam, 2 to 6 percent slopes
LoB	Lowell silt loam, 2 to 6 percent slopes
Me	Melvin silt loam, occasionally flooded (where drained)
MnB	Monongahela silt loam, 2 to 6 percent slopes
Nk	Newark silt loam, occasionally flooded (where drained)
Se	Sensabaugh gravelly loam, 0 to 4 percent slopes, occasionally flooded
SgB	Sensabaugh gravelly loam, 2 to 6 percent slopes
St	Stokly sandy loam, occasionally flooded (where drained)
TeB	Teddy loam, 1 to 6 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil (*26*).

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops, Pasture, and Hayland

William H. Amos, agronomist, Natural Resources Conservation Service, helped to prepare this section.

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed for each soil and, the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Crops and Pasture

In 1987, about 45,400 acres was used as cropland and pasture in Cumberland County (*41*). Of this amount, about one-half of the acreage was used for pasture and grazing. The rest was used as harvested cropland and idle cropland.

Acreage in crops and pasture remained fairly steady from 1982 to 1987. Land use tended toward hay and pasture crops rather than cultivated crops.

Soil erosion is the major concern on about 70 percent of the cropland and pastureland in the county. If slope is more than 2 percent, erosion is a hazard. Dewey, Holston, Lowell, Lonewood, and Renox soils, for example, have slopes of more than 2 percent.

Loss of the surface layer through erosion is damaging for several reasons. Productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil and on soils that have a root limiting layer in or below the subsoil. Dewey, Lowell, and Waynesboro soils have a clayey subsoil. Monongahela, Lawrence, and Teddy soils have a fragipan. On Cynthiana, Faywood, and Caneyville soils, bedrock is at a depth of less than 40 inches. Erosion also causes sedimentation and the transportation of herbicide, pesticide, and fertilizer residues. Sediment carried into streams and reservoirs résult in plugging stream channels, placing larger burdens on municipal water systems, and diminishing the water quality for recreation as well as fish and wildlife. In many sloping and moderately steep areas, for example on Dewey soils, preparing a good seedbed is difficult because part of the original surface layer has been lost through erosion.

Erosion control practices provide protective surface cover, help to control runoff, increase infiltration, and safely dispose of excess runoff. These practices range from relatively inexpensive management practices to more expensive engineering or constructed practices. Either type of practice or a combination of the two may be needed for adequate erosion control.

Conservation tillage, cover crops, crop residue left on the surface, contour farming, field borders or filter strips, and conservation cropping sequences are management practices that can be adapted to most soils in the county. Cropping sequences that keep vegetative cover on the soil for extended periods can hold soil losses to levels that do not reduce the productive capacity of the soils. Contour stripcropping is best adapted to soils that have smooth, uniform slopes, for example, most areas of Elk and Holston soils.

Terraces and diversions reduce the length of slope and help to control runoff and erosion. Grassed waterways provide a vegetative channel for the safe disposal of runoff. These practices are best suited to deep or very deep, well drained soils that have regular slopes. Most gently sloping and sloping areas of Elk and Holston soils are suited to terraces. Some areas of Dewey, Lowell, Lonewood, Crider, and Renox soils are also suited to terraces. Most of the nearly level and gently sloping soils in the county are suited to grassed waterways. Information and assistance for the design of erosion control practices for each kind of soil is available at local offices of the Natural Resources Conservation Service.

Natural soil fertility is medium or low on most soils on uplands, such as Dewey, Lonewood, Trimble, and Crider soils; and on soils on terraces, such as Holston, Waynesboro, and Monongahela soils. These soils are naturally acid and require applications of lime to maintain desired soil reaction levels. Natural soil fertility is medium or high on most soils on flood plains, such as Huntington, Chagrin, Sensabaugh, and Newark soils; and on soils on terraces and foot slopes, such as Elk and Renox soils. These soils range from very strongly acid to neutral. Additions of lime and fertilizer on all soils should be based on the results of soil tests, the need of the crop, and the expected level of yields. The Cooperative Extension Service can help determine the kinds and amounts of lime and fertilizer to apply.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water. On most soils used for row crops tilth is good and the surface layer is silt loam or loam. However, in areas that have been continually row cropped, the soil structure has been damaged and the organic matter depleted. When soil structure is broken down, the soil is unable to provide proper amounts of air and water. Adding organic matter helps maintain soil structure.

Soil drainage is a management concern on about 2 percent of the soils in the county. The seasonal high water table delays planting, limits crop production, or hinders harvesting operations in most years on poorly drained Melvin soils and on somewhat poorly drained Lawrence, Newark, and Stokly soils. Some of these soils may qualify as wetlands and thus could be restricted in their use and management.

Field crops suited to the soils and climate of the county include burley tobacco, corn, soybeans, and wheat. A small acreage of tomatoes and various other vegetables and small fruits are grown in the county.

Pasture and Hayland Management

Pasture and hayland management is necessary to produce the quantity and quality of forages needed for a successful livestock program. The soils in Cumberland County vary greatly in their ability to produce forage crops. Depth to a root limiting layer, internal drainage, ability to supply moisture, and inherent fertility and soil reaction are among the most important soil factors in forage production.

Plant species should be chosen with regard to soil conditions, the intended use of the forage crop, and the expected stand life (*16*). Deep and very deep, well drained soils are best suited to high producing, high quality forage crops, such as alfalfa. Plants such as taller growing legumes, red clover, and alfalfa, for example, are best suited for hay crops. The lower growing legumes, ladino clover for example, are best suited as pasture plants. Mixtures of grasses and legumes help to maximize yields of high quality forage. Legumes are able to fix nitrogen by transforming atmospheric nitrogen to a form plants can use, thus helping the grass species by providing them with some nitrogen. Some of the more frequently used grasses and legumes are tall fescue, ladino clover, red clover, alfalfa, and orchardgrass.

Pasture renovation is a good management tool to increase the yield and quality of existing stands. It can improve poor stands, weedy and brushy stands, and poor species mixtures.

Adequate fertility and proper pH level are important in producing forage crops. Additions of lime and fertilizer should be based on the results of soil tests, the need of the crop, and the expected level of yields. The Cooperative Extension Service can help determine the kinds and amounts of lime and fertilizer to apply.

Rotational grazing and deferred grazing are important management practices. Livestock may tend to overgraze sections of fields that have better forages and that are close to water and shade if rotational grazing is not used. Grazing can be deferred on areas that are droughty or wet. Rotational grazing and deferred grazing help to increase yields, maintain stands, reduce runoff, and increase infiltration rates. Deferred grazing also helps to reduce compaction and runoff during wet seasons and provides for grazing during periods of minimal plant growth.

Weed and brush control are also important practices. Clipping or mowing pastures at least once a year before weed seedheads are formed helps to control weed and brush species and allows more grazeable grasses to be utilized. A variety of herbicides are available to aid in weed and brush control.

For additional information on pasture and hayland management, contact the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management (*31*). The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 and IIIe-6.

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Charles A. Foster, forester, Natural Resources Conservation Service, helped to prepare this section.

Cumberland County is characterized by heavily forested, rolling hills. The extent of the timber resource is 131,900 acres (*20,30,35*), a 10 percent increase since 1963. Much of the increase resulted from abandoned submarginal fields and pastures becoming stocked with trees.

Hardwoods predominate in most stands. About 100,700 acres is oak-hickory, 11,900 acres is oak-pine, 7,400 acres is loblolly-shortleaf pine, and 11,900 acres is northern hardwoods, such as sugar maple and beech. Sawtimber is dominant on 53,000 acres, pole-sized trees cover 61,000 acres, and sapling and seedlings are on 17,900 acres.

Woodland tracts in the survey area are relatively small. About 43,200 acres is owned by farmers, 17,200 acres is owned by corporations, and the rest, some 71,500 acres, is owned by individuals. Average annual net growth is 31 cubic feet per acre per year. Recent data shows 17,200 acres of timber is poorly stocked and another 17,900 acres is overstocked with trees. Productivity for tree growth is poor or fair (20 to 84 cubic feet/acre/year) on 102,100 acres and good or very good (85 to 190 or more cubic feet/acre/year) on 29,800 acres.

Under proper management, tree growth, stocking, and quality can be improved. This will involve removal of low quality trees in fully stocked and understocked stands of all sizes as well as regeneration of sawtimber stands after harvest. Soil surveys are a useful management tool to identify the most productive sites, soil limitations for management, tree species to plant, and other factors.

The wood industry in Cumberland County consists of five commercial sawmills producing rough lumber, cross ties, pallet cants, construction timbers, charcoal wood, and chip wood. Several mills in adjacent counties also buy logs or standing timber.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table shows the difference in management concerns, potential productivity, and trees to plant attributable to warm or cool aspect.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table, the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands (*3,4,5,7,8,9,10,12,14,23,24,25,27,29*). Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to plant are those that are suitable for commercial wood production.

Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for dwellings without basements and for local roads and streets in table 10 and interpretations for septic tank absorption fields in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic (fig. 8). The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Raymond E. Toor, biologist, Natural Resources Conservation Service, helped to prepare this section.

The fish and wildlife resources of Cumberland County are a valuable commodity. Streams, rivers, and manmade impoundments provide habitat for fish. The forested areas interspersed with open land provide habitat for wildlife throughout the county.

Many of the soils found in Cumberland County are suitable for impounding water. Ponds, small streams, and large impoundments are stocked and managed for largemouth bass, smallmouth bass, channel catfish, bluegill, walleye, striped bass, and rainbow trout. Bear Creek, Crocus Creek, Marrowbone Creek, and Renox Creek are the major tributaries. The Cumberland River is the only major river in the survey area. Dale Hollow Lake, which is a manmade impoundment, is partially located in the survey area.

Some aquaculture operations exist in Cumberland County. Expansion of aquaculture depends on an adequate water supply, improvement of water quality, and marketing.

The major game species of wildlife in the survey area include white-tailed deer, gray squirrel, cottontail rabbit, bobwhite quail, mourning dove, ruffed grouse, raccoon, and gray and red fox. Eastern wild turkey is being reintroduced into the county.

Waterfowl are commonly found during the migration period in the survey area. These species include mallards, teal, widgeon, and Canada geese. Wood ducks, which nest in the survey area, are more permanent waterfowl residents.

Successful management of wildlife on any tract of land requires that food, cover, and water be available in a suitable combination. Lack of any one of these necessities, an unfavorable balance among them, or inadequate distribution of them may limit the reproduction and dissemination of desired kinds of wildlife. Soils information provides a valuable tool in creating, improving, or maintaining suitable food, cover, and water for wildlife. Soil interpretations for wildlife habitat aid in selecting the more suitable sites for various kinds of management. They serve as indicators of the intensity of management needed to achieve satisfactory results. They also serve as a means of showing why it may not be generally feasible to manage a particular area for a given kind of wildlife. Interpretations also serve in broad-scale planning of wildlife management areas, parks, and nature areas, or for acquiring wildlife lands.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife (*54*). This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

Elements of Wildlife Habitat

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, bluegrass, orchardgrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil

Figure 8.—Campgrounds and picnic areas in Dale Hollow State Park.

moisture are also considerations. Examples of wild herbaceous plants are chicory, goldenrod, beggarweed, aster, and ragweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, and blackberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, cattails, rushes, and sedges.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

Habitat for Various Kinds of Wildlife

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Land used for cropland, pastureland, or woodland also provides quality habitat for many kinds of wildlife when the following practices are applied: planned crop rotation, crop residue management, fallow spring disking of idle field borders, stripmowing, and leaving small areas of unharvested grain next to good cover.

Conservation practices, such as carefully planned mowing, deferred grazing, prescribed grazing systems, selective brush management, restoration of riparian stream corridors, and maintaining shrub field borders, generally benefit wildlife on improved pastureland.

On woodland, practices that benefit wildlife include clearing and thinning selectively; planting winter annuals on pipeline right-of-ways, on fire breaks, and in open areas; and protecting den trees and quality mast-producing trees.

Some practices harm wildlife. These include indiscriminate burning and use of chemicals for killing weeds and insects, heavy grazing, clean fall plowing, clear cutting of timber, draining of wetland depressions, and removal of all den and mast-producing trees.

Proper application of conservation practices must be based on the habitat needs of the wildlife to be managed. Conservation practices, if arbitrarily applied, could be detrimental to wildlife rather than beneficial. When managing for game species, many nongame species are also generally benefitted. Trained professionals from the Natural Resources Conservation Service, Kentucky Department of Fish and Wildlife Resources, or Kentucky Agricultural Extension Service, can provide technical assistance in planning or applying needed wildlife management practices.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 19.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas (*32*). Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $1/3$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields (*28*).

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, more than 6 percent; and *very high*, greater than 9 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). *Common* is used when the occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched, apparent, or artesian; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than

6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Physical and Chemical Analyses of Selected Soils

The results of physical analysis of several typical pedons in the survey area are given in table 17 and the results of chemical analysis in table 18. The data are for soils sampled at carefully selected sites. Unless otherwise indicated, the pedons are typical of the series. They are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the Kentucky Agricultural Experiment Station, Lexington, Kentucky.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods (*33*).

Coarse materials—(2-75 mm fraction) weight estimates of the percentages of all material less than 75 mm (3B1).

Sand—(0.05-2.0 mm fraction) weight percentages of material less than 2 mm (3A1).

Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of material less than 2 mm (3A1).

Organic carbon—wet combustion. Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c).

Extractable cations—ammonium acetate pH 7.0, EDTA-alcohol separation; calcium (6N2a), magnesium (602a); flame photometry; sodium (6P2a), potassium (6Q2a).

Extractable acidity—barium chloride-triethanolamine IV (6H5a).

Cation-exchange capacity—ammonium acetate, pH 7.0, steam distillation (5A8b).

Cation-exchange capacity—sum of cations (5A3a).

Base saturation—ammonium acetate, pH 7.0 (5C1).

Base saturation—sum of cations, TEA, pH 8.2 (5C3).

Reaction (pH)—1:1 water dilution (8C1f).

Available phosphorus—procedure (656) Kentucky Agricultural Experiment Station

Field Sampling—site selection (1A1)

Field Sampling—soil sampling (1A2)

Laboratory preparation—standard (air dry) material (1B1)

Particles—(specified size 2 mm (2A2)

Particles—less than 2 mm (2A1)

Data sheet symbols—(2B)

Particles—greater than 2 mm by field or laboratory weighing (3B1a)

Extractable bases—(5B1a)

Calcium carbonate equivalent—procedure (23b) USDA Handbook 60, USDA Salinity Laboratory 1954 (6N7)

Engineering Index Test Data

Table 19 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series described in the section "Soil Series and Their Morphology." The soil samples were tested by the Soil Mechanics Laboratory, Fort Worth, Texas.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); Moisture density—T 99 (AASHTO), D 698 (ASTM); Specific gravity—T 100 (AASHTO), D 854 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*34*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 20 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Paleudults (*Pale*, meaning excessive development, plus *udult*, the suborder of the Ultisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Paleudults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, siliceous, mesic Typic Paleudults.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The Trimble series is an example of fine-loamy, siliceous, mesic Typic Paleudalfs.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon is described. It is a small, three-dimensional area of soil that is typical of the series in the survey area. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (*38*). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (*34*) and in "Keys to Soil Taxonomy" (*37*). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Caneyville Series

The Caneyville series consists of moderately deep, well drained soils that have moderately slow permeability. These soils formed in residuum derived from coarse-grained limestone. They are on side slopes and ridges. Slopes range from 6 to 25 percent. Caneyville soils are fine, mixed, mesic Typic Hapludalfs.

Caneyville soils are generally near areas of rock outcrop and are on the same landscape as Crider, Dewey, Lonewood, and Trimble soils. Crider soils are very deep and fine-silty. Dewey and Lonewood soils are deep or very deep. They have a base saturation of less than 35 percent. Lonewood and Trimble soils are fine-loamy. Trimble soils commonly contain between 10 and 35 percent chert fragments in the particle-size control section.

A typical pedon of Caneyville silt loam, in an area of Caneyville-Lonewood complex, rocky, 6 to 25 percent slopes, eroded; Frogue Quadrangle, latitude 36 degrees 42 minutes 06 seconds N., longitude 85 degrees 18 minutes 12 degrees W.; east of Burkesville, about 4.3 miles on Kentucky Highway 90, south 3.8 miles on Kentucky Highway 449, south 1.1 miles on Scott-Finley Road, 1,100 feet east of Scott-Finley Road, in pasture:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; common fine roots; neutral; gradual wavy boundary.

Bt1—10 to 19 inches; strong brown and reddish yellow (7.5YR 4/6) loam; moderate fine subangular blocky structure; friable; few fine roots; few distinct clay films on faces of peds; neutral; clear wavy boundary.

2Bt2—19 to 32 inches; yellowish red (5YR 4/6) silty clay; moderate medium subangular blocky structure; firm; common distinct clay films on faces of peds; few fine black stains; neutral; clear wavy boundary.

2BC—32 to 36 inches; yellowish red (5YR 5/8) clay loam; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; few fine black stains; slightly acid; abrupt wavy boundary.

R—36 inches; coarse-grained, hard, gray limestone.

Thickness of the solum and depth to bedrock range from 20 to 40 inches. Rock fragments range, by volume, from 0 to 10 percent in the upper part of the solum and from 0 to 35 percent in the lower part. Reaction ranges from very strongly acid to neutral in the upper part of the solum and from moderately acid to mildly alkaline in the lower part.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4.

Some pedons have an AB horizon that has colors similar to those of the Ap horizon. The AB horizon is loam or silt loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, clay loam, silty clay loam, or silty clay.

The 2Bt horizon has hue of 7.5YR to 2.5YR, value of 4 or 5, and chroma of 4 to 8. In the fine earth fraction it is clay loam in most pedons and silty clay in some pedons.

The BC horizon has hue of 7.5YR to 2.5YR, value of 4 or 5, and chroma of 4 to 8. In some pedons it is mottled in shades of red, yellow, brown, olive, or gray. In the fine earth fraction it is loam, clay loam, silty clay, or clay.

Carpenter Series

The Carpenter series consists of very steep, deep and very deep, well drained soils. These soils formed in moderately permeable colluvium over slowly permeable residuum weathered from interbedded, calcareous siltstone and shale. They are on side slopes on uplands. Slopes range from 30 to 65 percent. Carpenter soils are fine-loamy, mixed, mesic Ultic Hapludalfs.

Carpenter soils are a taxajunct to the Carpenter series because they have a higher base saturation than defined for the series. But in use, management, and behavior they are similar to the Carpenter series. Carpenter soils are on the same landform as Garmon, Newbern, and Renox soils. Garmon soils are moderately deep. Newbern soils are shallow. Renox soils formed entirely in alluvium or colluvium from siltstone, shale, and limestone.

A typical pedon of Carpenter silt loam, in an area of Garmon-Carpenter-Newbern complex, rocky, 30 to 65 percent slopes; Frogue Quadrangle, latitude 36 degrees 41 minutes 29 seconds N., longitude 85 degrees 19 minutes 09 seconds W.; east of Burkesville, about 4.3 miles on Kentucky Highway 90, south 3.8 miles on Kentucky Highway 449, south 1.3 miles on the Scott-Finley Road, 1,000 feet southeast of the Scott-Finley Road, in a stand of mixed hardwoods:

Oi—2 inches to 0; partly decomposed leaves, twigs, and roots.

A—0 to 8 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many fine and medium roots; 5 percent channers; moderately acid; clear wavy boundary.

AB—8 to 13 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine subangular blocky structure; friable; common fine and medium roots; 5 percent channers; slightly acid; clear wavy boundary.

Bt1—13 to 27 inches; dark yellowish brown (10YR 4/6) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; few distinct clay films on faces of peds; 5 percent channers; slightly acid; gradual wavy boundary.

Bt2—27 to 39 inches; yellowish brown (10YR 5/6) channery silty clay loam; moderate medium subangular blocky structure; friable; few fine and medium roots; common distinct clay films on faces of peds; 15 percent channers; slightly acid; clear wavy boundary.

2BC—39 to 48 inches; yellowish brown (10YR 5/6) channery silty clay; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; 20 percent channers; slightly acid; abrupt wavy boundary.

Cr—48 to 52 inches; soft siltstone that has yellowish brown (10YR 5/6) silty clay in cracks; abrupt wavy boundary.

R—52 inches; hard, gray siltstone.

The solum ranges from 40 to 60 inches in thickness. Depth to bedrock ranges from 40 to 80 inches or more. Rock fragments range, by volume, from 0 to 35 percent in individual horizons. They make up, on average, about 10 to 25 percent of the control section. In unlimed areas reaction ranges from very strongly acid to slightly acid in the upper part of the solum and from very strongly acid to moderately acid in the lower part of the solum and in the C horizon.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. In some pedons it is less than 4 inches thick and has value of 3.

The AB horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam, silt loam, or silty clay loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 8. In the fine earth fraction it is silt loam, loam, or silty clay loam.

The 2BC horizon has colors similar to those of the Bt horizon. In the fine earth fraction the 2BC horizon is silty clay, clay, or silty clay loam.

The Cr horizon has colors similar to those of the BC horizon.

Chagrin Series

The Chagrin series consists of very deep, well drained, moderately permeable soils that formed in mixed alluvium. These soils are on flood plains. Slopes range from 0 to 3 percent. Chagrin soils are fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts.

Chagrin soils are on the same landform as Egam, Grigsby, Huntington, Melvin, Newark, and Sensabaugh soils. Egam soils are moderately well drained and fine. They have a deep, dark surface layer. Grigsby soils are coarse-loamy. Huntington soils are fine-silty and have a deep, dark surface layer. Melvin soils are poorly drained, Newark soils are somewhat poorly drained, and both are fine-silty. In Sensabaugh soils rock fragments make up 15 to 35 percent of the particle-size control section.

A typical pedon of Chagrin loam, occasionally flooded (fig. 9); Waterview Quadrangle, latitude 36 degrees 52 minutes 22 seconds N., longitude 85 degrees 23 minutes 43 seconds W.; north of Burkesville, about 7.0 miles on Kentucky Highway 61, 500 feet west of Kentucky Highway 61, adjacent to Big Renox Creek, in a field of tobacco:

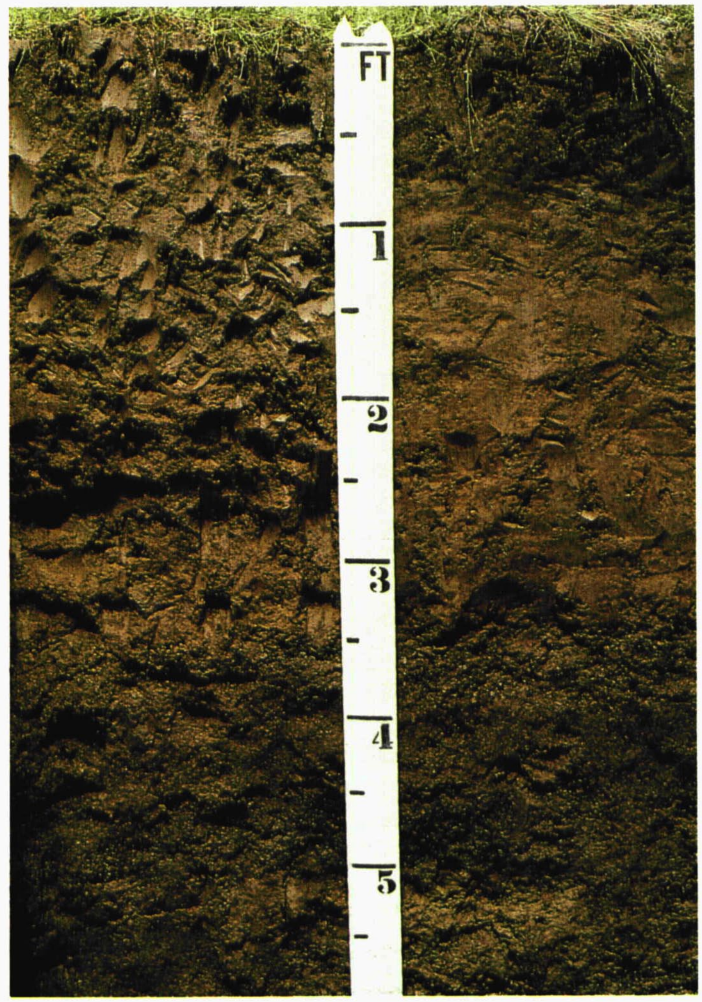

Figure 9.—Typical profile of Chagrin loam, occasionally flooded.

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) loam; moderate medium granular structure; friable; many fine roots; strongly acid; clear smooth boundary.

AB—10 to 25 inches; brown (10YR 4/3) loam; moderate medium subangular blocky structure; friable; common fine roots; 1 percent rounded pebbles; slightly acid; clear smooth boundary.

Bw1—25 to 31 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable; 1 percent rounded pebbles; moderately acid; clear smooth boundary.

Bw2—31 to 41 inches; dark yellowish brown (10YR 4/4) sandy clay loam; weak medium subangular blocky structure; friable; 5 percent rounded pebbles; moderately acid; clear smooth boundary.

C—41 to 75 inches; yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) sandy loam that is stratified with gravel; common medium distinct light olive brown (2.5Y 5/4) mottles; massive; moderately acid.

The solum ranges from 24 to 48 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range, by volume, from 0 to 15 percent in the control section and to as much as 25 percent below a depth of 40 inches. Reaction ranges from moderately acid to neutral throughout.

The Ap and AB horizons have hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam, silty clay loam, loam, or sandy clay loam.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. In most pedons it is mottled in brown or gray. In the fine earth fraction it is loam, silt loam, or sandy loam.

Crider Series

The Crider series consists of very deep, well drained soils that have moderate permeability. These soils formed in a silty mantle and the underlying residuum derived from limestone. They are on ridgetops and side slopes on uplands. Some areas are karst. Slopes range from 2 to 12 percent. Crider soils are fine-silty, mixed, mesic Typic Paleudalfs.

Crider soils are on the same landforms as Caneyville, Dewey, Lonewood, and Trimble soils. Caneyville soils are moderately deep and fine. Dewey soils are clayey and have a base saturation of less than 35 percent. Lonewood soils are fine-loamy and have a base saturation of less than 35 percent. Trimble soils are fine-loamy and have a base saturation of less than 35 percent. In most pedons they contain between 10 and 35 percent chert fragments in the particle-size control section.

Typical pedon of Crider silt loam, 2 to 6 percent slopes; Blacks Ferry Quadrangle, latitude 36 degrees 33 minutes 33 seconds N., longitude 85 degrees 23 minutes 36 seconds W.; south of Burkesville, about 3.9 miles on Kentucky Highway 61, northeast 1.3 miles on the Gaines Hill-Pleasant Hill road, 1,500 feet west of the of Gaines Hill-Pleasant Hill Road, in a hayfield:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam; weak fine and medium granular structure; very friable; many fine roots; slightly acid; clear wavy boundary.

Bt1—10 to 22 inches; strong brown (7.5YR 4/6) silty clay loam; weak fine subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—22 to 33 inches; strong brown (7.5YR 4/6) silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; common fine black concretions; moderately acid; gradual smooth boundary.

2Bt3—33 to 48 inches; yellowish red (5YR 4/6) silty clay loam; many coarse, distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; common distinct clay films on faces of peds; many fine and medium black stains and concretions; moderately acid; gradual smooth boundary.

2Bt4—48 to 65 inches; yellowish red (5YR 4/6) silty clay; moderate medium subangular blocky structure; friable; common distinct clay films on faces of peds; many medium black concretions; moderately acid; gradual smooth boundary.

2Bt5—65 to 76 inches; yellowish red (5YR 4/6) silty clay; moderate medium subangular blocky structure; friable; few faint clay films on faces of peds; few fine and medium black concretions; moderately acid.

Thickness of the solum and depth to bedrock are more than 60 inches. Rock fragments range, by volume, from 0 to 15 percent below the lithologic discontinuity. Reaction ranges from strongly acid to neutral to a depth of about 40 inches and from very strongly acid to slightly acid below that depth.

The Ap horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 3 or 4.

Some pedons have an AB or BA horizon that has color and texture similar to those of the Ap and Bt horizons, respectively.

In the upper part the Bt horizon has hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6. In the lower part it has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam.

The 2Bt horizon has hue of 5YR or 2.5YR, value or 4 or 5, and chroma of 4 to 8. It is predominantly silty clay or clay, but in the upper part it is commonly silty clay loam. In some pedons it has mottles in shades of red, brown, or yellow, and, in the lower part, shades of gray.

Some pedons have a 2BC or 2C horizon that has color and texture similar to those of the 2Bt horizon.

Cynthiana Series

The Cynthiana series consists of shallow, well drained and somewhat excessively drained soils that have moderately slow permeability. These soils formed in residuum of limestone of Ordovician age. They are on ridges and side slopes on uplands. Slopes range from 6 to 50 percent. Cynthiana soils are clayey, mixed, mesic Lithic Hapludalfs.

Cynthiana soils are commonly near areas of Rock outcrop and are on the same landforms as Faywood, Lowell, and Renox soils. Faywood soils are moderately deep. Lowell soils are deep or very deep. Renox soils are very deep and fine-loamy. They formed in alluvium or colluvium from interbedded siltstone, limestone, and shale.

Typical pedon of Cynthiana silty clay loam, in an area of Faywood-Cynthiana complex, rocky, 6 to 12 percent slopes, eroded; Waterview Quadrangle, latitude 36 degrees 48 minutes 17 seconds N., longitude 85 degrees 27 minutes 39 seconds W.; west of Burkesville, about 6.5 miles on Kentucky Highway 90, west 0.7 mile on Kentucky Highway 100, south 0.6 mile on Beech Grove Road, 450 feet southwest of Beech Grove Road, in pasture:

Ap—0 to 5 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium granular structure; friable; many fine roots; 2 percent limestone gravel; slightly acid; clear wavy boundary.

Bt1—5 to 12 inches; yellowish brown (10YR 5/6) clay that has dark yellowish brown (10YR 4/4) coatings on faces of peds; strong medium subangular blocky structure; firm; common fine roots; common distinct clay films on faces of peds; 2 percent limestone gravel; slightly acid; clear wavy boundary.

Bt2—12 to 18 inches; yellowish brown (10YR 5/6) gravelly silty clay; moderate medium subangular blocky structure; friable; few fine roots; few distinct clay films on faces of peds; 20 percent limestone gravel and channers; slightly acid; abrupt wavy boundary.

R—18 inches; hard, gray limestone.

Thickness of the solum and depth to bedrock range from 10 to 20 inches. Rock fragments consist mainly of gravel, channers, or flags of limestone or chert. They range, by volume, from 0 to 40 percent in the A horizon and from 5 to 45 percent in the Bt horizon. They make up, on average, less than 35 percent of the particle-size control section. Reaction ranges from slightly acid to mildly alkaline throughout.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. In some pedons it is less than 4 inches thick and has value of 2 or 3.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 6. In the fine earth fraction it is silty clay or clay.

Some pedons have a BC or C horizon that is mottled in shades of brown, olive, and gray. In the fine earth fraction the BC or C horizon is silty clay or clay.

Dewey Series

The Dewey series consists of very deep, well drained, moderately permeable soils that formed in residuum of limestone or in a layer of old alluvium and the underlying residuum of weathered limestone. These soils are on ridgetops and side slopes on uplands. Some areas are karst. Slopes range from 2 to 25 percent. Dewey soils are clayey, kaolinitic, thermic Typic Paleudults.

Dewey soils are a taxajunct to the Dewey series because they have lower clay exchange activity and in the solum are more than 20 percent sand, which exceeds the range for the series. These differences do not affect use, management, and behavior of these soils.

Dewey soils are on the same landforms as Caneyville, Crider, Lonewood, and Trimble soils. Caneyville soils are moderately deep and have a higher base saturation. Crider soils are fine-silty and have a higher base saturation. Lonewood soils are fine-loamy. Trimble soils are fine-loamy and commonly contain between 10 and 35 percent chert fragments in the particle-size control section.

Typical pedon of Dewey loam, 6 to 12 percent slopes, eroded (fig. 10); Frogue Quadrangle, latitude 36 degrees 41 minutes 03 seconds N., longitude 85 degrees 18 minutes 05 seconds W.; east of Burkesville, about 4.3 miles on Kentucky Highway 90, south 3.6 miles on Kentucky Highway 449, south 2.5 miles on Highway 1206, 300 feet east of Kentucky Highway 1206, in pasture:

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) loam; moderate fine subangular blocky; friable; common fine roots; 1 percent chert fragments; strongly acid; abrupt smooth boundary.

Bt1—10 to 20 inches; red (2.5YR 4/6) clay; moderate medium subangular and angular blocky structure; firm; common fine and medium roots; common distinct dark red (2.5YR 3/6) clay films on faces of peds; 1 percent chert fragments; very strongly acid; gradual wavy boundary.

Bt2—20 to 33 inches; dark red (2.5YR 3/6) clay; few medium prominent strong brown (7.5YR 4/6) mottles; strong medium and fine angular blocky structure; firm; common fine roots; many medium distinct dark red (10R 3/6) clay films on faces of peds; 5 percent chert fragments more than 3 inches in diameter; extremely acid; gradual wavy boundary.

Bt3—33 to 51 inches; red (2.5YR 4/6) clay; common medium distinct strong brown (7.5YR 4/6) and few medium distinct dark red (10R 3/6) mottles; moderate medium angular blocky structure; firm; few fine roots; few medium distinct dark red (10R 3/6) clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt4—51 to 68 inches; red (2.5YR 4/6) and strong brown (7.5YR 4/6) clay; common medium distinct dark red (10R 3/6) mottles; moderate medium subangular and angular blocky structure; firm; 10 percent chert fragments about 1/2 to 2 inches in diameter; very strongly acid; gradual wavy boundary.

Bt5—68 to 79 inches; strong brown (7.5Y 4/6) and red (2.5YR 4/6) clay; few medium prominent dark red

(10R 3/6) mottles; moderate medium subangular and angular blocky structure; firm; 10 percent chert fragments about 1/2 to 2 inches in diameter; very strongly acid.

Thickness of the solum and depth to bedrock are more than 60 inches. Chert fragments range, by volume, from 0 to 15 percent to a depth of 40 inches but to 25 percent below that depth. In unlimed areas reaction is strongly acid or very strongly acid.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4.

The Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 6 to 8. It is mottled in shades of brown or yellow. It is silty clay or clay.

Some pedons have a BC or C horizon that has colors and textures similar to those of the Bt horizon.

Egam Series

The Egam series consists of very deep, well drained or moderately well drained soils that have moderately slow permeability. These soils formed in fine textured alluvium mostly from limestone. They are on flood plains on the Cumberland River and near the mouths of its tributaries. Slopes range from 0 to 3 percent. Egam soils are fine, mixed, thermic Cumulic Hapludolls.

Egam soils are on the same landform as Chagrin, Grigsby, Huntington, Melvin, Newark, and Sensabaugh soils. Chagrin soils are fine-loamy. Grigsby soils are coarse-loamy. Huntington soils are fine-silty. Melvin and Newark soils are somewhat poorly drained and poorly drained, respectively, and are fine-silty. Sensabaugh soils are fine-loamy and contain between 15 and 35 percent rock fragments in the particle-size control section.

Typical pedon of Egam silty clay loam, rarely flooded; Blacks Ferry Quadrangle, latitude 36 degrees 44 minutes 26 seconds N., longitude 85 degrees 28 minutes 52 seconds W.; south of Burkesville, about 7.3 miles on Kentucky Highway 61, west 5.2 miles on Kentucky Highway 953, northwest 4.3 miles on Kentucky Highway 1424, south 0.4 mile on Cloyds Landing Road, 600 feet southeast of Cloyds Landing Road, in Salt Lick Bend, in pasture:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) moist and grayish brown (10YR 5/2) dry, silty clay loam; moderate medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

Bw1—9 to 16 inches; very dark grayish brown (10YR 3/2) silty clay; moderate fine and medium subangular blocky structure; friable; common fine roots; neutral; clear smooth boundary.

Bw2—16 to 32 inches; very dark grayish brown (10YR 3/2) clay; few fine prominent dark grayish brown (2.5Y 4/2) and few fine distinct (10YR 4/3) mottles; moderate medium angular blocky structure; firm; few fine roots; neutral; clear smooth boundary.

Bw3—32 to 50 inches; dark yellowish brown (10YR 4/4) clay; many coarse prominent very dark grayish brown (10YR 3/2) mottles; moderate medium prismatic structure parting to moderate fine angular blocky structure; firm; few fine roots; common fine black concretions; neutral; gradual smooth boundary.

Bw4—50 to 64 inches; dark yellowish brown (10YR 4/4) clay; common medium prominent dark grayish brown (2.5Y 4/2) mottles and few medium distinct dark brown (10YR 3/3) coatings on faces of peds; strong coarse subangular blocky structure; friable; slightly acid.

The solum is 40 inches or more in thickness. Depth to bedrock is more than 60 inches. The mollic epipedon ranges from 24 to 55 inches in thickness. Reaction ranges from moderately acid to neutral in the A and B horizons and from moderately acid to moderately alkaline below a depth of about 50 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3. In some pedons it has faint gray and brown mottles in the lower part.

In most pedons, in the upper part, the Bw horizon is part of the mollic epipedon and has colors similar to those of the Ap horizon. In the lower part the Bw horizon has hue of 10YR or 2.5Y, value of 4, and chroma of 3 or 4. In some pedons it is mottled in shades of brown or gray. It is silty clay loam, silty clay, or clay.

Some pedons have a BC or C horizon that has colors and textures similar to those in the lower part of the B horizon.

Elk Series

The Elk series consists of very deep, well drained soils that have moderate permeability. These soils formed in mixed alluvium. They are on broad ridgetops and side slopes of stream terraces and on foot slopes along the Cumberland River and its major tributaries. Slopes range from 0 to 25 percent. Elk soils are fine-silty, mixed, mesic Ultic Hapludalfs.

Elk soils are on the same landforms as Holston, Lawrence, Monongahela, Renox, and Waynesboro soils. Holston soils are fine-loamy and have a base saturation of less the 35 percent. Lawrence soils are somewhat poorly drained and have a fragipan. Monongahela soils are moderately well drained and fine-loamy. They have a fragipan. Renox soils are fine-loamy and commonly contain between 10 and 25 percent rock fragments. Waynesboro soils are clayey and have a base saturation of less than 35 percent.

Typical pedon of Elk silt loam, 2 to 6 percent slopes; Waterview Quadrangle, latitude 36 degrees 45 minutes 53 seconds N., longitude 85 degrees 25 minutes 41 seconds W.; south of Burkesville, 6.8 miles on Kentucky Highway 61, northwest 7.1 miles on Kentucky Highway 485, northwest 0.6 mile on a field road, 100 feet west of field road in Whites Bottom, in a field of tobacco:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; few fine roots; 2 percent rounded pebbles; slightly acid; clear smooth boundary.

Bt1—8 to 25 inches; dark yellowish brown (10YR 4/4) silt loam; moderate very fine subangular blocky structure; friable; few fine roots; few light gray silt coatings on faces of peds; 2 percent rounded pebbles; strongly acid; clear smooth boundary.

Bt2—25 to 43 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; very few fine roots; common distinct clay films on faces of peds and in pores; few light gray silt coatings on faces of peds; few fine black stains and concretions; 2 percent rounded pebbles; strongly acid; clear smooth boundary.

Bt3—43 to 60 inches; strong brown (7.5YR 5/6) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; common distinct yellowish brown (10YR 5/6) clay films on faces of peds; few light gray silt coatings on faces of peds; 2 percent rounded pebbles; strongly acid.

The solum ranges from 40 to 60 inches or more in thickness. Depth to bedrock is more than 60 inches. Rounded rock fragments range, by volume, from 0 to 5 percent in the solum and from 0 to 35 percent in the C horizon. In unlimed areas reaction ranges from slightly acid to very strongly acid in the solum and from slightly acid to strongly acid in the C horizon.

The Ap horizon has hue of 10YR, value of 4, and chroma of 3 or 4.

Some pedons have an AB or BA horizon that has colors and textures similar to those of the Ap or Bt horizon.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam. In the upper part it has few to common mottles in shades of brown. In the lower part it has mottles in shades of brown or gray.

Some pedons have a BC or C horizon that has colors and textures similar to those of the Bt horizon. The BC or C horizon is silt loam or silty clay loam. In some pedons the C horizon consists of stratified layers of fine sandy loam, loam, clay loam, or silty clay.

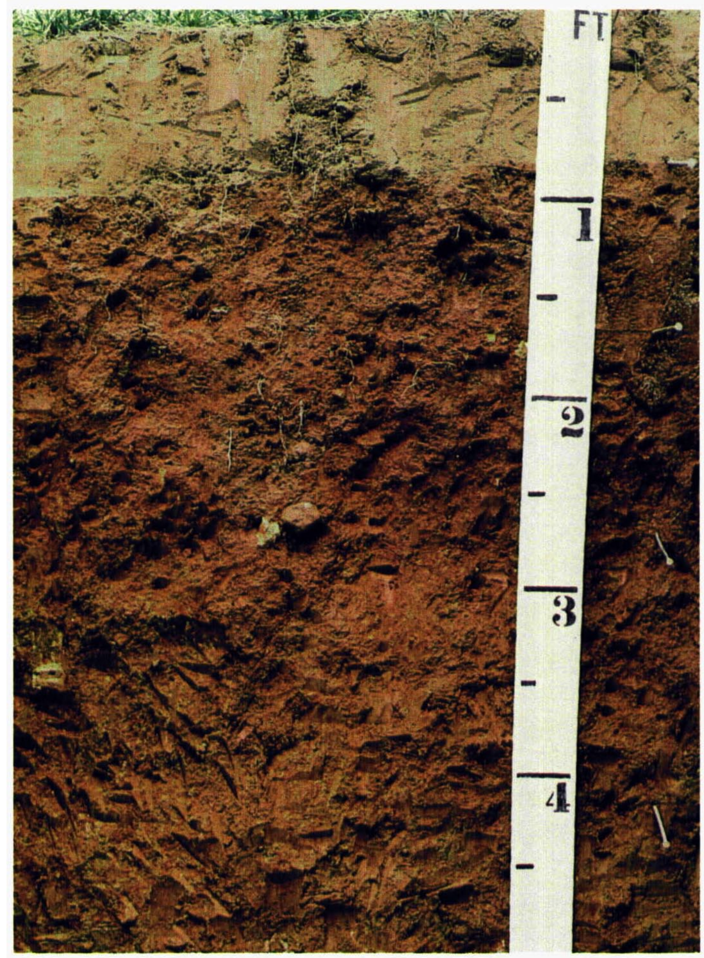

Figure 10.—Typical profile of Dewey loam, 6 to 12 percent slopes, eroded.

In some pedons a lithologic discontinuity is below a depth of about 50 inches.

Faywood Series

The Faywood series consists of moderately deep, well drained soils that have moderately slow or slow permeability. These soils formed in residuum of limestone of Ordovician age interbedded with thin layers of shale. They are on ridgetops and side slopes on uplands. Slopes range from 6 to 50 percent. Faywood soils are fine, mixed, mesic Typic Hapludalfs.

Faywood soils are on the same landforms as Cynthiana, Lowell, and Renox soils. Cynthiana soils are shallow. Lowell soils are deep or very deep. Renox soils are deep or very deep and are fine-loamy. They formed in alluvium or colluvium from interbedded limestone, siltstone, and shale.

Typical pedon of Faywood silty clay loam, in an area of

Faywood-Cynthiana complex, rocky, 6 to 12 percent slopes, eroded; Waterview Quadrangle, latitude 36 degrees 48 minutes 16 seconds N., longitude 85 degrees 27 minutes 38 seconds W.; west of Burkesville, about 6.5 miles on Kentucky Highway 90, west 0.7 mile on Kentucky Highway 100, south 0.6 mile on Beech Grove Road, 250 feet southwest of Beech Grove Road, in pasture:

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium granular structure; friable; many fine roots; 2 percent limestone gravel; neutral; gradual wavy boundary.

Bt1—6 to 15 inches; yellowish brown (10YR 5/4) flaggy clay; moderate medium subangular blocky structure; firm; few distinct clay films on faces of peds; 20 percent flagstones and channers; neutral; clear wavy boundary.

Bt2—15 to 30 inches; yellowish brown (10YR 5/6) flaggy clay; moderate medium subangular blocky structure; firm; few distinct clay films on faces of peds; few fine roots; 30 percent flagstones and channers; neutral; abrupt wavy boundary.

R—30 inches; hard, gray limestone.

Thickness of the solum and depth to bedrock range from 20 to 40 inches. Rock fragments consist mainly of flagstones or channers of limestone or shale. They range, by volume, from 0 to 15 percent in the A horizon and from 0 to 30 percent in the Bt horizon and, if present, the BC horizon. They range, by volume, to as much as 35 percent in the C horizon, if present. Reaction ranges from strongly acid to mildly alkaline throughout.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

Some pedons have a BA horizon that has colors and textures similar to those of the Bt horizon.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 6. In some pedons, in the lower part, it is mottled in shades of olive or brown. In the fine earth fraction it is silty clay, clay, or silty clay loam.

Some pedons have a BC or C horizon that has colors and textures similar to those of the lower part of the Bt horizon.

Garmon Series

The Garmon series consists of moderately deep, well drained soils that have moderately rapid permeability. These soils formed in residuum of interbedded, calcareous siltstone, shale, and limestone. They are on ridgetops and side slopes on uplands. Slopes range from 12 to 65 percent. Garmon soils are fine-loamy, mixed, mesic Dystric Eutrochrepts.

Garmon soils are on the same landforms as Carpenter and Newbern soils. Carpenter soils are deep or very deep. Newbern soils are shallow.

Typical pedon of Garmon loam, in an area of Garmon-Carpenter-Newbern complex, rocky, 30 to 65 percent slopes; Amandaville Quadrangle, 36 degrees 55 minutes 14 seconds N., longitude 85 degrees 17 minutes 15 seconds W.; north of Burkesville, about 4.1 miles on Kentucky Highway 61, northeast 10.3 miles on Kentucky Highway 704, 350 feet north of Kentucky Highway 704, in a stand of mixed hardwoods:

Oi—1 to 0 inches; partly decomposed leaves, twigs, and roots.

A—0 to 3 inches; dark brown (10YR 3/3) loam; moderate medium granular structure; friable; many fine and medium roots; 10 percent channers; neutral; clear smooth boundary.

BA—3 to 7 inches; dark yellowish brown (10YR 4/4) channery silt loam; weak fine subangular blocky structure; friable; many fine and medium roots; 15 percent channers; slightly acid; clear wavy boundary.

Bw1—7 to 15 inches; dark yellowish brown (10YR 4/4) channery silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; 15 percent channers; slightly acid; clear wavy boundary.

Bw2—15 to 24 inches; yellowish brown (10YR 5/4) channery silt loam; moderate medium subangular blocky structure; friable; common fine and medium roots; 15 percent channers; slightly acid; abrupt wavy boundary.

R—24 inches; hard, gray shale and siltstone.

Thickness of the solum and depth to bedrock range from 20 to 40 inches. Rock fragments consist mainly of shale, siltstone, and limestone channers. They range, by volume, from 2 to 45 percent in individual horizons. They make up, on average, between 10 and 35 percent of the particle-size control section. Reaction ranges from very strongly acid to neutral in the upper part of the solum and from moderately acid to neutral in the lower part.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. In some pedons the A horizon has value of 3 or less and is less than 4 inches thick.

The BA horizon has colors similar to those of the Bw horizon. In the fine earth fraction it is silt loam or loam.

The Bw horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4 to 8. In the fine earth fraction it is silt loam, loam, or silty clay loam.

Some pedons have a BC or C horizon that has colors and textures similar to those of the B horizon.

Grigsby Series

The Grigsby series consists of very deep, well drained soils that have moderate or moderately rapid permeability.

These soils formed in mixed alluvium. They are on flood plains of the Cumberland River. Most areas are protected from flooding by Wolf Creek Dam. Slopes range from 0 to 4 percent. Grigsby soils are coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts.

Grigsby soils are on the same landform as Chagrin, Egam, Huntington, Newark, and Stokly soils. Chagrin soils are fine-loamy. Egam soils are moderately well drained and fine. Huntington soils are fine-silty. Newark soils are somewhat poorly drained and fine-silty. Stokly soils are somewhat poorly drained.

Typical pedon of Grigsby fine sandy loam; Burkesville Quadrangle, latitude 36 degrees 49 minutes 51 seconds N., longitude 85 degrees 21 minutes 40 seconds W.: east of Burkesville, about 1.4 miles on Kentucky Highway 90, north 4.3 miles on Kentucky Highway 1880, north and west about 1.1 miles on Scotts Bottom Road, west about 0.3 mile on a field road, 250 feet north of field road in Scotts Bottom, in a hayfield:

Ap—0 to 10 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; common fine roots; moderately acid; clear smooth boundary.

Bw1—10 to 18 inches; brown (10YR 4/3) fine sandy loam; weak medium subangular blocky structure; very friable; few fine roots; moderately acid; gradual wavy boundary.

Bw2—18 to 34 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine subangular blocky structure; very friable; few fine roots; moderately acid; gradual smooth boundary.

C1—34 to 44 inches; dark yellowish brown (10YR 4/4) loamy fine sand; massive; very friable; slightly acid; gradual smooth boundary.

C2—44 to 62 inches; yellowish brown (10YR 5/4) loamy fine sand; massive; thin stratification; very friable; slightly acid.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock is more than 60 inches. Rounded rock fragments range, by volume, from 0 to 10 percent throughout. Reaction ranges from moderately acid to neutral in the solum and from strongly acid to neutral in the C horizon.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4.

The Bw horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. In some pedons it is mottled in shades of gray or brown below a depth of 24 inches. It is loam, fine sandy loam, or sandy loam.

Some pedons have a BC or CB horizon that has colors and textures similar to those of the B horizon.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam, fine sandy loam, sandy loam, or loamy fine sand and is commonly stratified.

Holston Series

The Holston series consists of very deep, well drained, moderately permeable soils formed in old alluvium. These soils are on ridges and side slopes of stream terraces on the Cumberland River. Slopes range from 2 to 25 percent. Holston soils are fine-loamy, siliceous, thermic Typic Paleudults.

Holston soils are on the same landforms as Elk, Lowell, Monongahela, and Waynesboro soils. Elk soils are fine-silty. They have a base saturation of more than 35 percent. Lowell soils are fine. They formed in residuum derived from limestone. Monongahela soils are moderately well drained and have a fragipan. Waynesboro soils are clayey.

Typical pedon of Holston silt loam, 2 to 6 percent slopes (fig. 11); Blacks Ferry Quadrangle, latitude 36 degrees 45 minutes 57 seconds N., longitude 85 degrees 27 minutes 09 seconds W.; west of Burkesville, about 3.1 miles on Kentucky Highway 90, south 6.5 miles on Kentucky Highway 691, south 0.2 mile on a field road, 400 feet west of field road, in Washes Bottom, in a hayfield of orchardgrass:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many fine roots; moderately acid; clear wavy boundary.

Bt1—10 to 26 inches; yellowish brown (10YR 5/6) silt loam; moderate fine subangular blocky structure; friable; few faint clay films on faces of peds; common fine roots; strongly acid; gradual wavy boundary.

Bt2—26 to 39 inches; strong brown (7.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; few distinct clay films on faces of peds; few fine roots; 1 percent rounded gravel; very strongly acid; gradual wavy boundary.

Bt3—39 to 54 inches; strong brown (7.5YR 4/6) clay loam; moderate medium subangular and angular blocky structure; firm; few medium distinct clay films on faces of peds; 5 percent rounded gravel; very strongly acid; gradual wavy boundary.

Bt4—54 to 75 inches; strong brown (7.5YR 5/8) and (7.5YR 4/6) clay loam; moderate medium subangular and angular blocky structure; firm, 5 to 10 percent brittle; common distinct clay films on faces of peds; 4 percent rounded gravel; very strongly acid.

Thickness of the solum and depth to bedrock are more than 60 inches. Rounded rock fragments range, by volume, from 0 to 10 percent throughout. In unlimed areas reaction is very strongly acid or strongly acid.

The Ap horizon has hue of 10YR, value of 4, and chroma of 3 or 4.

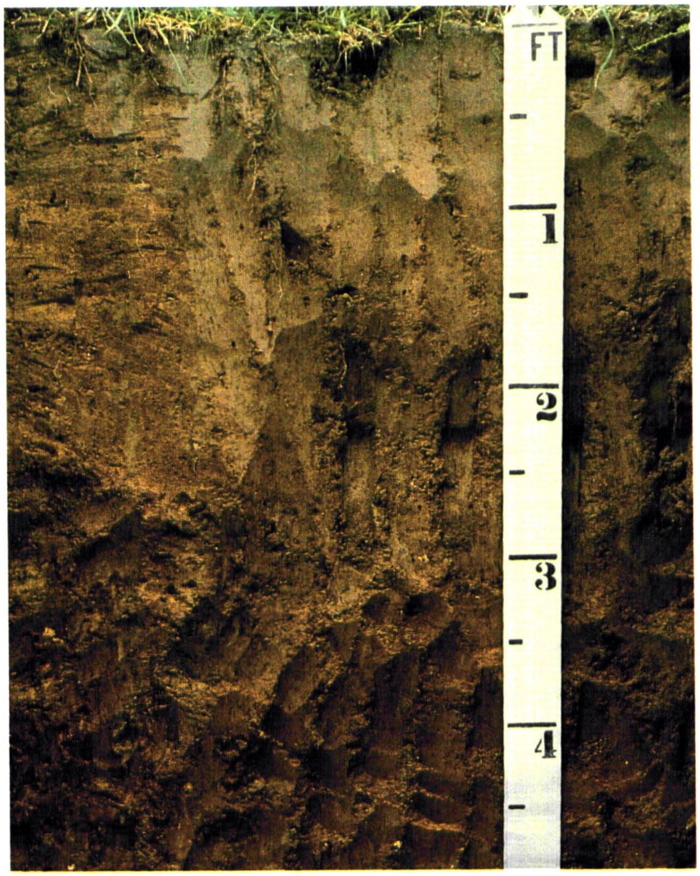

Figure 11.—Typical profile of Holston silt loam, 2 to 6 percent slopes. This very deep soil formed in old alluvium.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 8. It is loam or clay loam. In some pedons, below a depth of about 40 inches, it is clay and has hue of 5YR.

Huntington Series

The Huntington series consists of very deep, well drained, moderately permeable soils that formed in mixed alluvium. These soils are on flood plains of the Cumberland River. Most areas are protected from flooding by Wolf Creek Dam. Slopes range from 0 to 3 percent. Huntington soils are fine-silty, mixed, mesic Fluventic Hapludolls.

Huntington soils are on the same landform as Chagrin, Egam, Grigsby, Melvin, Newark, and Sensabaugh soils. Chagrin soils are fine-loamy. Egam soils are fine. Grigsby soils are coarse-loamy. Melvin soils are poorly drained. Newark soils are somewhat poorly drained. Sensabaugh soils are fine-loamy. In Sensabaugh soils rock fragments make up 15 to 35 percent of the particle-size control section.

Typical pedon of Huntington silt loam, overwash (fig. 12); Waterview Quadrangle, latitude 36 degrees 45 minutes 05 seconds N., longitude 85 degrees 28 minutes 57 seconds W.; south of Burkesville, about 7.3 miles on Kentucky Highway 61, west 5.2 miles on Kentucky Highway 953, northwest 4.8 miles on Kentucky 1424, east 0.5 mile on a farm road, 650 feet north of farm road and about 500 feet from the Cumberland River, in Salt Lick Bend, in a cultivated field:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

A—10 to 23 inches; dark brown (10YR 3/3) moist and brown (10YR 5/3) dry, silt loam; moderate fine subangular blocky structure; friable; few fine roots; neutral; clear smooth boundary.

Bw1—23 to 35 inches; dark yellowish brown (10YR 4/4) loam; common medium distinct brown (10YR 5/3) coatings; moderate medium subangular blocky structure; friable; slightly acid; clear smooth boundary.

Bw2—35 to 50 inches; dark yellowish brown (10YR 4/4) silty clay loam; many medium distinct dark grayish brown (10YR 4/2) mottles; moderate medium prismatic structure parting to subangular and angular blocky; friable; moderately acid; clear smooth boundary.

Bw3—50 to 75 inches; dark brown (7.5YR 4/4) silty clay loam; many medium distinct brown (10YR 5/3) silt coatings on faces of peds; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; moderately acid.

The solum is more than 40 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range, by volume, from 0 to 3 percent throughout. Reaction ranges from moderately acid to mildly alkaline throughout.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 3 or 4.

The Ab horizon has hue of 10YR, value of 3, and chroma of 3. It is silt loam or silty clay loam.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silty clay loam, silt loam, or loam. In some pedons, in the lower part, it has brown or gray mottles.

Some pedons have a BC horizon that has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam, silty clay loam, or loam.

Some pedons have a CB or C horizon that has colors similar to those of the BC horizon. The CB or C horizon is stratified. It is silt loam, silty clay loam, fine sandy loam, or loam.

Lawrence Series

The Lawrence series consists of very deep, somewhat poorly drained soils that have a slowly permeable fragipan. These soils formed in old, mixed alluvium or colluvium. They are on stream terraces and alluvial fans. Slopes range from 0 to 4 percent. Lawrence soils are fine-silty, mixed, mesic Aquic Fragiudalfs.

Lawrence soils are on the same landforms as Elk, Holston, Monongahela, Newark, and Renox soils. Elk soils are well drained and do not have a fragipan. Holston soils are well drained and fine-loamy. They do not have a fragipan. Monongahela soils are moderately well drained and fine-loamy. Newark soils have neither an argillic horizon nor a fragipan. Renox soils are well drained and fine-loamy. They commonly contain 10 to 25 percent rock fragments.

Typical pedon of Lawrence silt loam, 0 to 4 percent slopes; Waterview Quadrangle, latitude 36 degrees 47 minutes 52 seconds N., longitude 85 degrees 25 minutes 14 seconds W.; west of Burkesville, about 4.1 miles on Kentucky Highway 90, 900 feet south of Kentucky Highway 90, in pasture:

Ap—0 to 8 inches; yellowish brown (10YR 5/4) silt loam; moderate medium granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

Bt—8 to 20 inches; brownish yellow (10YR 6/6) silty clay loam; many medium distinct light brownish gray (10YR 6/2) and common medium prominent (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; moderately acid; clear wavy boundary.

Btxg1—20 to 32 inches; light brownish gray (10YR 6/2) silt loam; common medium prominent strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; very firm; few fine roots along prism faces; few distinct clay films on faces of peds; few fine and medium black and red stains and concretions; strongly acid; gradual wavy boundary.

Btxg2—32 to 48 inches; light brownish gray (10YR 6/2) silt loam; common medium prominent strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few distinct clay films on faces of peds; common fine and medium black and red concretions; strongly acid; clear wavy boundary.

2Cg—48 to 68 inches; light brownish gray (2.5Y 6/2) silty clay; many medium prominent strong brown (7.5YR 5/8) mottles; massive; firm; few fine and medium black and red stains and concretions; neutral; gradual wavy boundary.

The solum ranges from 40 to 80 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range, by volume, from 0 to 10 percent throughout. In unlimed areas reaction is very strongly acid to slightly acid above the fragipan, very strongly acid or strongly acid in the fragipan, and very strongly acid to neutral below the fragipan. Depth to the fragipan ranges from 18 to 32 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 6. It is mottled in shades of brown or gray. It is silt loam or silty clay loam.

The Btxg horizon has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 2 or less or it is neutral and has value of 5 to 7. In many pedons it is equally mottled in shades of gray and brown. It is silt loam or silty clay loam.

The 2Cg horizon has hue of 7.5YR to 5Y, value of 4 to

Figure 12.—Typical profile of Huntington silt loam, overwash.

8, and chroma of 1 to 8. It is silt loam, silty clay loam, silty clay, or clay. In some pedons it is stratified loam, silt loam, and silty clay loam below a depth of 40 inches.

Lonewood Series

The Lonewood series consists of deep and very deep, well drained, moderately permeable soils that formed in a silty mantle and in the underlying residuum of weathered siltstone, sandstone, and shale. These soils are on ridgetops and side slopes of undulating plateaus, benches, and ridges. Some areas are karst. Slopes range from 2 to 25 percent. Lonewood soils are fine-loamy, siliceous, mesic Typic Hapludults.

Lonewood soils are on the same landforms as Caneyville, Crider, Dewey, and Trimble soils. Caneyville soils are moderately deep and fine. They have a base saturation of more than 35 percent. Dewey soils are clayey. Crider soils are fine-silty and have a base saturation of more than 35 percent. In most pedons of Trimble soils chert fragments make up 10 to 35 percent of the surface layer and the particle-size control section.

Typical pedon of Lonewood silt loam, 6 to 12 percent slopes, eroded; Frogue Quadrangle, latitude 36 degrees 44 minutes 37 seconds N., longitude 85 degrees 17 minutes 27 seconds W.; east of Burkesville, about 4.3 miles on Kentucky Highway 90, south 2.9 miles on Kentucky Highway 449, east 0.3 mile on Kentucky Highway 1351, 1.1 miles north on Riddle Road, 600 feet northeast of Riddle Road, in pasture:

Ap—0 to 7 inches; brown (10YR 5/3) silt loam; many medium distinct light yellowish brown (10YR 6/4) mottles; moderate fine granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

BA—7 to 14 inches; light yellowish brown (10YR 6/4) silt loam; common faint brownish yellow (10YR 6/6) coatings on faces of peds; weak medium angular and subangular blocky structure; friable; common fine roots; strongly acid; clear wavy boundary.

Bt1—14 to 20 inches; yellowish brown (10YR 5/6) loam; common medium distinct light yellowish brown (10YR 6/4) mottles; moderate medium and coarse subangular blocky structure; friable; few distinct clay films on faces of peds; common fine roots; 2 percent sandstone gravel; strongly acid; clear wavy boundary.

Bt2—20 to 26 inches; strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) clay; common medium distinct light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; firm; few distinct clay films on faces of peds; few fine roots; 1 percent sandstone gravel; very strongly acid; clear wavy boundary.

2Bt3—26 to 34 inches; yellowish red (5YR 5/6) and strong brown (7.5YR 5/8) clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium angular blocky structure; firm; few distinct clay films on faces of peds; few fine roots; 5 percent sandstone gravel; very strongly acid; clear smooth boundary.

2BC—34 to 46 inches; mottled yellowish red (5YR 5/8), brownish yellow (10YR 6/8), and yellowish brown (10YR 5/6) gravelly sandy loam; weak coarse platy structure; firm; about 30 percent soft and 5 percent hard sandstone gravel; very strongly acid; clear smooth boundary.

2C—46 to 59 inches; brownish yellow (10YR 6/8) gravelly sandy loam; few fine distinct pale brown (10YR 6/3) mottles and brown (7.5YR 4/4) silt and clay coatings; weak coarse platy relict rock structure; firm; 25 percent sandstone gravel and channers; extremely acid; clear smooth boundary.

2Cr—59 to 71 inches; yellow (10YR 7/6) and strong brown (7.5YR 5/8); soft sandstone.

The solum ranges from 40 to 65 inches in thickness. In most pedons depth to bedrock is 40 to 72 inches. In some pedons it is more than 72 inches. Sandstone fragments range, by volume, from 0 to 5 percent in the A and BA horizons and in the upper part of the Bt horizon, from 0 to 10 percent in the lower part of the Bt horizon, and from 10 to 50 percent in the C horizon. In unlimed areas reaction is extremely acid to strongly acid throughout.

The Ap horizon has a hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

The BA horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. It is loam or silt loam.

The Bt and 2Bt horizons have hue of 10YR to 5YR, value of 4 or 5, and chroma of 4 to 8. They are dominantly loam, clay loam, or clay, but include silt loam and silty clay loam. In some pedons the Bt horizon does not have a lithologic discontinuity.

The 2BC and 2C horizons have hue of 10YR to 2.5YR, value of 4 or 5, and chroma of 6 to 8. In some horizons they are mottled without a dominant color. They are loam, sandy loam, clay loam, silty clay loam, or clay.

The 2Cr horizon is yellow and brown, soft sandstone.

Lowell Series

The Lowell series consists of deep and very deep, well drained soils that have moderately slow permeability. These soils formed in residuum of limestone of Ordovician age interbedded with thin layers of shale. They are on ridgetops and side slopes on uplands. Slopes range from 2 to 25 percent. Lowell soils are fine, mixed, mesic Typic Hapludalfs.

Lowell soils are on the same landforms as Cynthiana, Faywood, and Renox soils. Cynthiana soils are shallow. Faywood soils are moderately deep. Renox soils are fine-loamy and formed in alluvium or colluvium from interbedded limestone, siltstone, and shale.

Typical pedon of Lowell silt loam, 6 to 12 percent slopes, eroded; Waterview Quadrangle, latitude 36 degrees 48 minutes 38 seconds N., longitude 85 degrees 28 minutes 07 seconds W.; west of Burkesville, about 6.5 miles on Kentucky Highway 90, west 1.1 miles on Kentucky Highway 100, south 0.5 mile on Noah Hollow Road, 250 feet southeast of the Noah Hollow Road, in pasture:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium granular structure; friable; common fine roots; slightly acid; abrupt wavy boundary.

Bt1—8 to 28 inches; strong brown (7.5YR 5/6) clay; moderate medium subangular blocky structure; firm; common fine roots; many distinct clay films on faces of peds; moderately acid; clear wavy boundary.

Bt2—28 to 47 inches; strong brown (7.5YR 5/8) clay; common medium distinct pale brown (10YR 6/3) coatings on ped faces; moderate fine and medium subangular blocky structure; firm; few fine roots; few distinct clay films on faces of peds; many fine black stains and concretions; 2 percent chert gravel; strongly acid.

Bt3—47 to 60 inches; strong brown (7.5YR 5/6) silty clay loam; many distinct yellowish brown (10YR 5/6) and few fine prominent light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; firm; few distinct clay films on faces of peds; few fine black stains and concretions; 2 percent chert gravel; strongly acid.

The solum ranges from 30 to 60 inches in thickness. Depth to bedrock ranges from 40 to 80 inches or more. Rock fragments consist mainly of limestone, siltstone, or chert. They range, by volume, to 5 percent in the upper part of the solum and to 15 percent in the lower part. In unlimed areas reaction ranges from very strongly acid to slightly acid to a depth of about 30 inches and from strongly acid to mildly alkaline below that depth.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

Some pedons have a BA horizon that has colors and textures similar to those of the Ap horizon. The BA horizon is silt loam or silty clay loam.

The Bt horizon has hue of 2.5Y to 7.5YR, value of 4 or 5, and chroma of 4 to 8. In some pedons it is mottled in shades of olive, gray, or brown in the lower part. It is silty clay loam, silty clay, or clay.

The BC horizon has hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 4 to 6. It is mottled in shades of olive, gray, or brown. It is silty clay loam, silty clay, or clay.

Some pedons have a C horizon that has colors and textures similar to those of the BC horizon.

Some pedons have a Cr horizon that is soft, interbedded shale, siltstone, or limestone.

Melvin Series

The Melvin series consists of very deep, poorly drained, moderately permeable soils that formed in alluvium. These soils are on flood plains and in depressions. Slopes range from 0 to 2 percent. Melvin soils are fine-silty, mixed, nonacid, mesic Typic Fluvaquents.

Melvin soils are on the same landforms as Chagrin, Grigsby, Huntington, Newark, and Stokly soils. Chagrin soils are well drained and fine-loamy. Grigsby soils are well drained and coarse-loamy. Huntington soils are well drained. Newark soils are somewhat poorly drained. Stokly soils are somewhat poorly drained and coarse-loamy.

Typical pedon of Melvin silt loam, occasionally flooded; Waterview Quadrangle, latitude 36 degrees 45 minutes 35 seconds N., longitude 85 degrees 25 minutes 16 seconds W.; south of Burkesville, 6.8 miles on Kentucky Highway 61, northwest 6.7 miles on Kentucky Highway 485, northwest 0.9 mile on a private road; 750 feet east of the Cumberland River, along a drainageway in pasture:

Ap—0 to 10 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.

Bg1—10 to 29 inches; light olive gray (5Y 6/2) silt loam; few fine distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable; common fine roots; few black and red stains and concretions; moderately acid; gradual wavy boundary.

Bg2—29 to 36 inches; light olive gray (5Y 6/2) silt loam; many medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; many black stains and concretions; moderately acid; gradual wavy boundary.

Cg—36 to 60 inches; gray (5Y 6/1) silty clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; many black stains and concretions; moderately acid.

The solum is 20 to 40 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments consist mainly of rounded pebbles. They range, by volume, from 0 to 5 percent to a depth of 30 inches and to as much as 20 percent in individual horizons below that depth. Most pedons contain concretions. Reaction ranges from moderately acid to mildly alkaline.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. Some pedons have an A horizon that underlies a thin O horizon.

The Bg horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 2 or less, or the horizon is neutral and value is 4 to 6, or it is mottled in shades of brown or red. It is silt loam or silty clay loam.

Some pedons have a BCg horizon that has colors and textures similar to those of the Bg horizon.

The Cg horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 2 or less, or the horizon is neutral and value is 4 to 6 or it is mottled in shades of gray, brown, or red. It is silt loam, silty clay loam, or loam. In some pedons, below a depth of 40 inches, it is stratified loamy, clayey, sandy, and gravelly material.

Monongahela Series

The Monongahela series consists of very deep, moderately well drained soils that have moderately slow or slow permeability in the fragipan. These soils are on foot slopes on uplands and on broad ridgetops and side slopes of river terraces along the Cumberland River and its major tributaries. Slopes range from 2 to 12 percent. Monongahela soils are fine-loamy, mixed, mesic Typic Fragiudults.

Monongahela soils are a taxajunct to the Monongahela series because they have less weatherable minerals in the control section than allowed for the series. These soils also have a thicker solum than allowed for the series. These differences do not affect the use, management, and behavior of these soils.

Monongahela soils are on the same landforms as Elk, Lawrence, Holston, and Waynesboro soils. Elk soils are well drained and fine-silty. They have a base saturation of more than 35 percent. Holston soils are well drained and do not have a fragipan. Lawrence soils are somewhat poorly drained and have a base saturation of more than 35 percent. Waynesboro soils are well drained and clayey. They do not have a fragipan.

Typical pedon of Monongahela silt loam (fig. 13), 2 to 6 percent slopes; Waterview Quadrangle, latitude 36 degrees 45 minutes 35 seconds N., longitude 85 degrees 28 minutes 59 seconds W.; west of Burkesville, about 3.1 miles on Kentucky Highway 90, south 4.5 miles on Kentucky Highway 691, northeast 0.6 mile on Kentucky Highway 1205, 800 feet southwest of Kentucky Highway 1205, in Washes Bottom, adjacent to an abandoned homestead in pasture:

Ap—0 to 11 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many fine roots; 1 percent rounded gravel; slightly acid; clear wavy boundary.

Bt—11 to 22 inches; yellowish brown (10YR 5/4) loam; few fine faint pale brown (10YR 6/3) and few fine distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; friable; few fine clay films on faces of peds; common fine roots; few fine black stains and concretions; 1 percent rounded gravel; strongly acid; gradual wavy boundary.

Btx1—22 to 35 inches; brownish yellow (10YR 6/8) and (10YR 6/6) loam; moderate medium distinct light brownish gray (10YR 6/2) mottles; weak medium prismatic structure parting to moderate medium angular and subangular blocky; friable, 40 percent brittle; few fine roots along gray streaks; few fine clay films on faces of peds; common medium black stains and concretions; 1 percent rounded pebbles; very strongly acid; gradual wavy boundary.

Btx2—35 to 53 inches; brownish yellow (10YR 6/8) and (10YR 6/6) sandy clay loam; many medium distinct light gray (10YR 7/1) and light brownish gray (10YR 6/2) mottles; moderate coarse prismatic structure parting to weak medium subangular and angular blocky; firm, 60 percent brittle; few fine clay films on faces of peds; common medium black stains and concretions; 1 percent rounded gravel; very strongly acid; gradual wavy boundary.

Bx1—53 to 70 inches; brown (7.5YR 5/4) fine sandy loam; many medium distinct light gray (10YR 7/2) and brownish yellow (10YR 6/8) mottles; weak coarse and very coarse prismatic structure parting to weak medium angular and subangular blocky; firm, 40 percent brittle; common medium black stains and concretions; 1 percent rounded gravel; very strongly acid; gradual wavy boundary.

Bx2—70 to 83 inches; yellowish brown (10YR 5/6) fine sandy loam; many medium distinct light gray (10YR 7/2), brownish yellow (10YR 6/8), and reddish yellow (7.5YR 6/8) mottles; weak coarse prismatic structure parting to weak medium angular and subangular blocky structure; friable, about 50 percent brittle; strongly acid.

The solum ranges from 40 to 72 inches or more in thickness. Depth to bedrock is more than 60 inches. Rounded or subrounded rock fragments range, by volume, from 0 to 15 percent throughout. In unlimed areas reaction is very strongly acid or strongly acid. Depth to the fragipan ranges from 18 to 32 inches.

The Ap horizon has hue of 10YR, value 4 or 5, and chroma of 3 or 4.

Some pedons have a BA horizon that has colors and textures similar to those of the Bt horizon.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to

6, and chroma of 4 to 6. It is silt loam, silty clay loam, loam, or clay loam. In some pedons, in the lower part, it has mottles of gray or brown.

The Btx and Bx horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, fine sandy loam, sandy clay loam, or silt loam. It is mottled in shades of gray, brown, or red.

Some pedons have a BC or C horizon that has colors similar to those of the Btx horizon. The BC or C horizon generally has more sand or more gravel.

Nelse Series

The Nelse series consists of very deep, well drained soils that have moderately rapid or rapid permeability. These soils formed in recent alluvium. They are on flood plains of the Cumberland River and its tributaries. Slopes range from 10 to 25 percent. Nelse soils are coarse-loamy, mixed, nonacid, mesic Mollic Udifluvents.

Nelse soils are on the same landform as Grigsby and Huntington soils. Grigsby soils have a cambic horizon. Huntington soils are fine-silty.

Typical pedon of Nelse fine sandy loam, 10 to 25 percent slopes, frequently flooded; Burkesville Quadrangle, latitude 36 degrees 46 minutes 44 seconds N., longitude 85 degrees 22 minutes 20 seconds W.; east of Burkesville, about 0.7 mile on Kentucky Highway 90, 1,000 feet south of Kentucky Highway 90 bridge on the west bank of the Cumberland River, in a hayfield:

Ap—0 to 6 inches; dark brown (10YR 3/3) fine sandy loam; weak medium granular structure; very friable; many fine roots; neutral; clear wavy boundary.

C1—6 to 31 inches; brown (10YR 4/3) sandy loam; massive; very friable; few fine roots; neutral; gradual wavy boundary.

C2—31 to 56 inches; brown (10YR 4/3) sandy loam; few fine yellowish brown (10YR 5/6) strata of sand; massive; very friable; few fine roots; slightly acid; clear wavy boundary.

C3—56 to 62 inches; dark yellowish brown (10YR 4/4) stratified fine sandy loam, silt loam, and silty clay loam; massive; very friable; few fine roots; slightly acid.

Depth to bedrock ranges from 60 to 80 inches or more. Rounded or subrounded rock fragments, as much as 3 inches in size, range, by volume, from 1 to 15 percent. Reaction ranges from strongly acid to moderately alkaline.

The Ap horizon has hue of 10YR, value of 2 to 5, and chroma of 2 to 4. After mixing, to a depth of 6 inches, moist, it has value and chroma of less than 4.

The C horizon has hue of 2.5Y or 10YR, value of 3 to 6, and chroma of 2 to 6. In the fine earth fraction it is silt loam, loam, fine sandy loam, sandy loam, loamy fine sand, or loamy sand. In some pedons it is stratified. In most pedons it has bedding planes of very fine sand to medium sand.

Figure 13.—Typical profile of Monongahela silt loam, 2 to 6 percent slopes. The fragipan in the subsoil is at a depth of 22 to 70

Newark Series

The Newark series consists of very deep, somewhat poorly drained, moderately permeable soils. These soils are on flood plains. They formed in mixed alluvium. Slopes range from 0 to 2 percent. Newark soils are fine-silty, mixed, nonacid, mesic Aeric Fluvaquents.

Newark soils are on the same landform as Chagrin, Huntington, Lawrence, Melvin, Sensabaugh, and Stokly soils. Chagrin soils are well drained and fine-loamy. Huntington soils are well drained. Lawrence soils have a fragipan. Melvin soils are poorly drained. Sensabaugh soils are well drained and fine-loamy. They contain between 15 and 35 percent rock fragments in the particle-size control section. Stokly soils are coarse-loamy.

Typical pedon of Newark silt loam, occasionally flooded; Blacks Ferry Quadrangle, latitude 36 degrees 44 minutes 24 seconds N., longitude 85 degrees 29 minutes

47 seconds W.; south of Burkesville, about 7.3 miles on Kentucky Highway 61, west 5.2 miles on Kentucky Highway 953, northwest 4.3 miles on Kentucky Highway 1424, south and west 1 mile on Cloyds Landing Road, 1,500 feet southwest east of a 90 degree curve in Cloyds Landing Road, in Salt Lick Bend, in a grass sod field:

Ap—0 to 6 inches brown (10YR 4/3) silt loam; weak medium granular structure; very friable; many fine roots; neutral; clear smooth boundary.

Bw—6 to 18 inches; olive brown (2.5Y 4/4) silt loam; few fine prominent dark brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; few fine roots; slightly acid; gradual smooth boundary.

Bg—18 to 37 inches; grayish brown (2.5Y 5/2) silt loam; weak coarse subangular blocky structure; friable; few fine roots; few black stains and concretions; moderately acid; abrupt smooth boundary.

Cg1—37 to 45 inches; dark gray (2.5Y 4/1) loam; massive; friable; common black and red stains and common fine black concretions; neutral; clear wavy boundary.

Cg2—45 to 60 inches; dark gray (2.5Y 4/1) silt loam; massive; friable; common black and red stains and common fine black concretions; neutral.

The solum ranges from 20 to 50 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments consist mainly of rounded or subrounded gravel. They range, by volume, to about 5 percent to a depth of 30 inches, to as much as 15 percent below a depth of 30 inches, and to as much as 60 percent below a depth of 40 inches. Reaction is moderately acid to mildly alkaline throughout the profile.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. In some pedons it is mottled in shades of brown or gray.

The Bw horizon has matrix colors of hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is mottled in shades of brown or gray. It is silt loam or silty clay loam.

The Bg horizon has matrix colors of 10YR or 2.5Y, value of 4 to 7, and chroma of 0 to 2. It is mottled in shades of brown. It is silty clay loam or silt loam.

Some pedons have a BC horizon that has colors and textures similar to those of the Bg horizon.

The Cg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 2 or less or the horizon is neutral and value is 4 to 7. It is mottled in shades of brown. It is silt loam, silty clay loam, or loam.

Newbern Series

The Newbern series consists of shallow, somewhat excessively drained and excessively drained soils that have moderate permeability. These soils formed in residuum of interbedded, calcareous siltstone, shale, and limestone. They are on ridges and side slopes on uplands. Slopes range from 12 to 65 percent. Newbern soils are loamy, mixed, mesic Lithic Eutrochrepts.

Newbern soils are on the same landforms as Carpenter and Garmon soils. Carpenter soils are deep and very deep and have an argillic horizon. Garmon soils are moderately deep.

Typical pedon of Newbern channery silt loam, in an area of Garmon-Carpenter-Newbern complex, rocky, 30 to 65 percent slopes; Frogue Quadrangle, latitude 36 degrees 38 minutes 46 seconds N., longitude 85 degrees 21 minutes 13 seconds W.; south of Burkesville, about 10.3 miles on Kentucky Highway 61, east 0.2 mile on Spears Chapel Road, east 0.4 mile on Cherry Tree Ridge Road, 4,000 feet east of the Cherry Tree Ridge Road, near Casey Branch, in a mixed hardwood forest:

Oi—1 inch to 0; partly decomposed leaves, twigs, and roots.

A—0 to 2 inches; brown (10YR 4/3) channery silt loam; moderate medium granular structure; friable; many fine roots; 15 percent channers; neutral; clear smooth boundary.

BA—2 to 7 inches; brown (10YR 5/3) channery silt loam; moderate fine subangular blocky structure; friable; common fine and medium roots; 15 percent channers; slightly acid; clear wavy boundary.

Bw—7 to 17 inches; yellowish brown (10YR 5/4) channery silt loam; moderate medium subangular blocky structure; few fine roots; 20 percent channers; slightly acid; abrupt wavy boundary.

R—17 inches; hard, gray siltstone.

Thickness of the solum and depth to bedrock range from 10 to 20 inches. Rock fragments consist mainly of angular siltstone, shale, or limestone. They range, by volume, from 5 to 80 percent in individual horizons, but make up less than 35 percent of the particle-size control section. They generally increase in volume with depth. Reaction ranges from moderately acid to neutral in the A horizon and is slightly acid or neutral in the B horizon.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. In some pedons it is less than 4 inches thick and has value of 3 and chroma of 2 or 3.

Some pedons have a BA horizon that has colors and textures similar to those of the A and Bw horizons.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. In the fine earth fraction it is silt loam or loam.

Some pedons have a BC or C horizon that is similar in color and texture to the Bw and Cr horizons.

Some pedons have a Cr horizon that has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 8. It consists of partly weathered siltstone, shale, or limestone and loam or silt loam in cracks and crevices.

Renox Series

The Renox series consists of very deep, well drained, and moderately permeable soils that formed in loamy alluvium or colluvium derived from interbedded siltstone, shale, limestone, and to a lesser extent, sandstone. These soils are on colluvial foot slopes, the lower parts of side slopes, and alluvial fans. Slopes range from 6 to 50 percent. Renox soils are fine-loamy, mixed, mesic Ultic Hapludalfs.

Renox soils are on the same landforms as Carpenter, Elk, Faywood, Garmon, and Lowell soils. Carpenter soils formed in colluvium and residuum derived from interbedded siltstone, shale, and limestone. Elk soils are fine-silty. Faywood soils are moderately deep and fine. Garmon soils are moderately deep. Lowell soils are fine.

Typical pedon of Renox gravelly loam, 6 to 12 percent slopes, eroded (fig. 14); Breeding Quadrangle, latitude 36 degrees 52 minutes 37 seconds N., longitude 85 degrees 24 minutes 00 seconds W.; north of Burkesville, about 7.4 miles on Kentucky Highway 61, about 200 feet southwest of Kentucky Highway 61 and about 520 feet northeast of Big Renox Creek, in a field of tobacco:

Ap—0 to 6 inches; brown (10YR 4/3) gravelly loam; moderate medium granular structure; friable; many fine roots; 16 percent gravel, mostly shale and siltstone; strongly acid; clear smooth boundary.

BA—6 to 13 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak very fine subangular blocky structure; friable; common fine roots; about 15 percent gravel, mostly shale and siltstone; moderately acid; clear wavy boundary.

Bt1—13 to 24 inches; brown (10YR 4/3) gravelly loam; moderate fine subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; 25 percent gravel, mostly shale and siltstone; slightly acid; clear wavy boundary.

Bt2—24 to 36 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; 13 percent gravel, mostly shale and siltstone; slightly acid; clear wavy boundary.

Bt3—36 to 53 inches; dark yellowish brown (10YR 4/4) loam; moderate medium and coarse subangular blocky structure; friable; few faint clay films on faces of peds; 8 percent gravel, mostly shale and siltstone; slightly acid; clear wavy boundary.

BC—53 to 67 inches; yellowish brown (10YR 5/4) loam; weak coarse subangular blocky structure; friable; 10 percent gravel, mostly shale and siltstone; moderately acid.

Thickness of the solum ranges from 40 to more than 60 inches. Depth to bedrock is more than 60 inches. Rock fragments consist mainly of gravel or channers of shale, siltstone, limestone, chert, geodes, and sandstone. They range, by volume, from 1 to 30 percent in the solum and from 1 to 50 percent below the solum. Reaction ranges from moderately acid to mildly alkaline throughout.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4.

The BA horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. In the fine earth fraction it is loam, silt loam, or silty clay loam.

The Bt horizon has hue of 10YR or 7.5, value of 4 or 5, and chroma of 3 to 6. In the fine earth fraction it is loam, silt loam, silty clay loam, or clay loam.

The BC horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 6. In some pedons it is mottled in shades of brown or gray. In the fine earth fraction it is

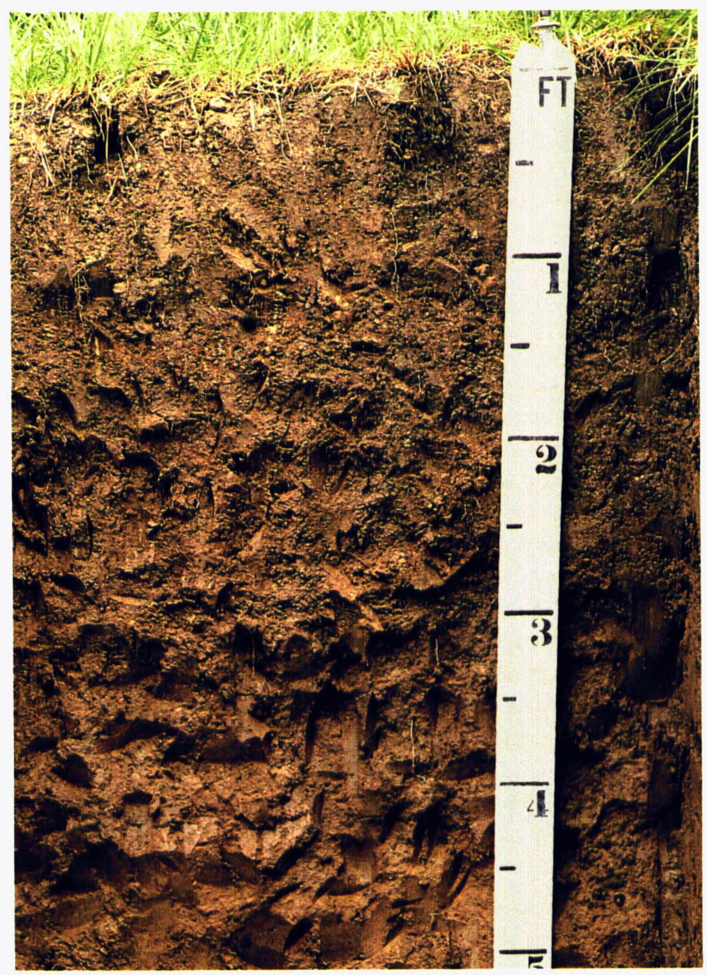

Figure 14.—Typical profile of Renox gravelly loam, 6 to 12 percent slopes, eroded. Gravel and channers are common in this soil.

loam, silt loam, silty clay loam, clay loam, and sandy loam in most pedons and silty clay in some pedons.

Some pedons have a C horizon that is similar in color and texture to the BC horizon. Some pedons have a lithologic discontinuity below a depth of 50 inches.

Rohan Series

The Rohan series consists of shallow, well drained soils that have moderate or moderately slow permeability. These soils formed in residuum derived from black, acid shale of Devonian age. They are on narrow ridgetops and side slopes on uplands. Slopes range from 12 to 50 percent. Rohan soils are loamy-skeletal, mixed, mesic Lithic Dystrochrepts.

Rohan soils are on the same landforms as Trappist soils and are commonly adjacent to Cynthiana, Faywood, Garmon, Lowell, and Newbern soils. Trappist soils are moderately deep and clayey. Cynthiana soils are clayey. Faywood soils are moderately deep and fine. Garmon soils are moderately deep and fine-loamy. Lowell soils are deep and very deep and fine. Newbern soils have a higher base saturation and have fewer rock fragments in the particle-size control section.

Typical pedon of Rohan channery silt loam, 20 to 50 percent slopes, gullied; Waterview Quadrangle, latitude 36 degrees 47 minutes 53 seconds N., longitude 85 degrees 27 minutes 39 seconds W.; west of Burkesville, about 6.5 miles on Kentucky Highway 90, west 0.7 mile on Kentucky Highway 100, south 1.0 mile on Beech Grove Road, 500 feet west of the Beech Grove Road, in a forest of mixed eastern redcedar and hardwoods:

Oi—1 inch to 0; partly decomposed leaves, twigs, roots, and cedar needles.

A—0 to 4 inches; dark brown (10YR 3/3) channery silt loam; moderate medium granular structure; friable; common fine and medium roots; 15 percent channers of black shale; very strongly acid; clear wavy boundary.

Bw—4 to 18 inches; dark yellowish brown (10YR 4/4) very channery silt loam; weak fine and medium subangular blocky structure; friable; few fine roots; 40 percent channers of black shale; very strongly acid; clear wavy boundary.

Cr—18 to 20 inches; dark yellowish brown (10YR 4/4) weathered shale that has a black (10YR 2/1) interior; extremely acid; abrupt boundary.

R—20 inches; hard, black shale.

The solum ranges from 8 to 20 inches in thickness. Depth to bedrock ranges from 10 to 20 inches. Rock fragments range from 5 to 75 percent in individual horizons. They make up, on average, 35 percent or more of the control section. In unlimed areas reaction ranges from very strongly acid to moderately acid in the A horizon and from extremely acid to strongly acid in the B and C horizons.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 2 to 4.

Some pedons have a BA horizon that has colors and textures similar to those of the Bw horizon.

The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. In some pedons it has mottles in shades of red, brown, or yellow. In the fine earth fraction it is loam, silty clay loam, clay loam, or silt loam.

Some pedons have a C horizon that has colors and textures similar to those of the Bw horizon.

The Cr horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The texture in the fine earth fraction that fills cracks and crevices is similar to that of the Bw horizon.

Sensabaugh Series

The Sensabaugh series consists of very deep, well drained soils that have moderate or moderately rapid permeability. These soils formed in loamy alluvium from limestone, siltstone, sandstone, and shale. They are on flood plains and alluvial fans. Slopes range from 0 to 6 percent. Sensabaugh soils are fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts.

Sensabaugh soils are on the same landforms as Chagrin, Melvin, Newark, and Renox soils. In Chagrin soils rock fragments make up less than 15 percent of the particle-size control section. Melvin soils are poorly drained and Newark soils are somewhat poorly drained; both are fine-silty. Renox soils have an argillic horizon and are commonly on adjacent foot slopes and alluvial fans.

Typical pedon of Sensabaugh gravelly loam, 0 to 4 percent slopes, occasionally flooded; Burkesville Quadrangle, latitude 36 degrees 45 minutes 31 seconds N., longitude 85 degrees 17 minutes 18 seconds W.; east of Burkesville, about 5.7 miles on Kentucky Highway 90, southeast 1.0 mile on Bear Creek Church Road, 50 feet north of Bear Creek Church Road, near Vaughn Creek, in a plowed field:

Ap—0 to 11 inches; brown (10YR 4/3) gravelly loam; weak very fine subangular blocky and moderate medium granular structure; friable; few fine roots; 16 percent gravel; moderately acid; clear smooth boundary.

Bw—11 to 25 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium prismatic parting to weak medium subangular blocky structure; friable; few fine roots; 5 percent gravel; moderately acid; clear wavy boundary.

Ab—25 to 35 inches dark brown (10YR 3/3) gravelly loam;

weak medium prismatic parting to weak medium subangular blocky structure; friable; common fine roots; 15 percent gravel; moderately acid; clear smooth boundary.

Bwb—35 to 55 inches; brown (10YR 4/3) very gravelly sandy loam; weak coarse platy structure; friable; 40 percent gravel; slightly acid; abrupt wavy boundary.

C1—55 to 64 inches; mottled dark gray (2.5Y 4/0) and light olive brown (2.5Y 5/4) gravelly loam; massive, weakly stratified; friable; 15 percent gravel and 2 percent cobbles; slightly acid; gradual wavy boundary.

C2—64 to 79 inches; light olive brown (2.5Y 5/4) extremely gravelly sandy clay loam; massive, moderately stratified; friable; 60 percent gravel and 10 percent cobbles; slightly acid.

The solum ranges from 24 to 55 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments consist of gravel and channers of shale, siltstone, sandstone, and limestone. They range, by volume, from 2 to 25 percent in the A horizon, from 15 to 40 percent in the B horizon, and to as much as 70 percent in the C horizon. They range, by volume, from 15 to 35 percent in the control section. Reaction ranges from moderately acid to mildly alkaline throughout.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 to 4.

The Bw horizon has hue of 10YR, value of 4 or 5, and value of 3 to 6. The buried Ab and Bwb horizons have hue of 10YR, value of 3 or 4, and chroma of 3 or 4. In the fine earth fraction these horizons are loam, silt loam, silty clay loam, clay loam, or sandy loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6 or hue of 5YR or 2.5YR, value of 3 or 4, and chroma of 3 or 4. In some pedons, below a depth of 24 inches, is has few or common mottles in shades of gray, brown, and yellow. In the fine earth fraction it is loam, fine sandy loam, clay loam, sandy clay loam, silt loam, or silty clay loam.

Stokly Series

The Stokly series consists of very deep, somewhat poorly drained soils that have moderately rapid permeability. These soils formed in alluvium from sandstone and siltstone. They are on flood plains. Slopes range from 0 to 2 percent. Stokly soils are coarse-loamy, mixed, acid, mesic Aeric Fluvaquents.

Stokly soils are on the same landform as Chagrin, Grigsby, Huntington, Newark, and Melvin soils. Chagrin and Grigsby soils are well drained. Huntington soils are well drained and fine-silty. Newark soils are fine-silty. Melvin soils are poorly drained and fine-silty.

Typical pedon of Stokly sandy loam, occasionally flooded; Wolf Creek Dam Quadrangle, latitude 36 degrees 52 minutes 18 seconds N., longitude 85 degrees 14 minutes 20 seconds W.; east of Burkesville, about 8.8 miles on Kentucky Highway 90, north 1.7 miles on Kentucky Highway 1880, north 5.7 miles on Kentucky Highway 379, 500 feet north of Kentucky Highway 379 and 375 feet west of the Cumberland River, in Irish Bottom, in abandoned pasture:

Ap—0 to 7 inches; brown (10YR 5/3) sandy loam; weak fine granular structure; very friable; common fine roots; strongly acid; clear wavy boundary.

Bw—7 to 20 inches; light olive brown (2.5Y 5/3) sandy loam; few medium faint grayish brown (2.5Y 5/2) and few fine prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; very friable; common fine roots; strongly acid; gradual wavy boundary.

Bg—20 to 38 inches; light grayish brown (2.5Y 6/2) sandy loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; very friable; few brown concretions; strongly acid; gradual wavy boundary.

Cg1—38 to 50 inches; light grayish brown (2.5Y 6/2) loamy sand; common medium prominent yellowish brown (10YR 5/6) mottles; structureless; very friable; strongly acid; gradual wavy boundary.

Cg2—50 to 60 inches; mottled grayish brown (2.5Y 5/2), light grayish brown (2.5Y 6/2), and yellowish brown (10YR 5/6) loamy sand; structureless; very friable; strongly acid.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments consist mainly of rounded gravel. They range, by volume, from 0 to 15 percent in the solum and from 0 to 40 percent in the C horizon. In unlimed areas reaction ranges from strongly acid to extremely acid.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. In some pedons it is mottled in shades of brown or gray.

Some pedons have an AB or BA horizon that has colors and textures similar to those of the Ap or Bw horizon.

The Bw horizon has hue of 10YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is loam, sandy loam, or fine sandy loam.

The Bg horizon has hue of 10YR to 5Y, value of 6 or 7, and chroma of 2 or less. It is mottled in shades of gray or brown. It is loam, fine sandy loam, or sandy loam.

The Cg horizon has colors similar to those of the Bg horizon. It is loam, fine sandy loam, sandy loam, or loamy sand.

Teddy Series

The Teddy series consists of very deep, moderately well drained soils that have a slowly permeable fragipan. These soils formed in residuum weathered from interbedded sandstone, shale, siltstone, and limestone. They are on smooth benches and plateaus, on side slopes, and around drainageways on uplands. Slopes range from 1 to 6 percent. Teddy soils are fine-loamy, siliceous, mesic Typic Fragiudults.

Teddy soils are commonly adjacent to Dewey and Lonewood soils on the landscape. Dewey and Lonewood soils are well drained and do not have a fragipan. Dewey soils are clayey.

Typical pedon of Teddy loam, 1 to 6 percent slopes; Burkesville Quadrangle, latitude 36 degrees 48 minutes 28 seconds N., longitude 85 degrees 17 minutes 25 seconds W.; east of Burkesville, about 1.4 miles on Kentucky Highway 90, north and east 8.7 miles on Kentucky Highway 1880, 1,400 feet northeast of Kentucky Highway 1880, on Smith Grove Ridge, in pasture:

Ap—0 to 5 inches; brown (10YR 5/3) loam; weak medium granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.

BA—5 to 12 inches; light yellowish brown (10YR 6/4) loam; weak fine subangular blocky structure; friable; few fine roots; slightly acid; gradual smooth boundary.

Bt—12 to 22 inches; light yellowish brown (10YR 6/4) and brownish yellow (10YR 6/6) loam; few fine distinct light brownish gray (10YR 5/2) mottles near the lower boundary of the horizon; weak medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

Btx1—22 to 40 inches; brownish yellow (10YR 6/8) loam; many medium distinct light brownish gray (10YR (6/2) seams along faces of peds; moderate coarse prismatic structure parting to weak medium angular blocky; firm; few distinct clay films on faces of peds; 2 percent gravel; very strongly acid; gradual smooth boundary.

Btx2—40 to 62 inches; brownish yellow (10YR 6/8) and strong brown (7.5YR 5/6) loam; many medium distinct gray (10YR 6/1) seams along faces of peds; moderate coarse prismatic structure parting to moderate medium angular blocky; firm; few distinct clay films on faces of peds; very strongly acid.

Thickness of the solum and depth to bedrock are more than 60 inches. Rock fragments range from 0 to 2 percent in the upper part of the solum and from 0 to 15 percent in the lower part. In unlimed areas reaction is very strongly acid or strongly acid.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

The BA horizon has hue of 10YR, value of 5 or 6, and chroma of 4.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 3 to 6. It is loam, silt loam, or silty clay loam.

The Btx horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is mottled in shades of gray and brown. It is loam, clay loam, or silt loam.

Trappist Series

The Trappist series consists of moderately deep, well drained soils that have moderately slow permeability. These soils formed in residuum of black, acid shale of Devonian age. They are on ridgetops and side slopes on uplands. Slopes range from 6 to 25 percent. Trappist soils are clayey, mixed, mesic Typic Hapludults.

Trappist soils are on the same landforms as Rohan soils and are commonly adjacent to Cynthiana, Faywood, Garmon, and Newbern soils on the landscape. Rohan soils are shallow and loamy-skeletal. Cynthiana soils are shallow and formed in residuum of limestone of Ordovician age. Faywood soils are fine and formed in residuum of limestone of Ordovician age. Garmon soils are fine-loamy and have a higher base saturation. Newbern soils are shallow and loamy. They have a higher base saturation.

Typical pedon of Trappist silt loam, 6 to 12 percent slopes, eroded; Waterview Quadrangle, latitude 36 degrees 48 minutes 14 seconds N., longitude 85 degrees 28 minutes 30 seconds W.; west of Burkesville, about 6.5 miles on Kentucky Highway 90, west 1.2 miles on Kentucky Highway 100, south 1.1 miles on the Noah Hollow Road, 400 feet east of the Noah Hollow Road, in abandoned pasture:

Ap—0 to 7 inches; brown (7.5YR 4/4) silt loam; moderate medium granular structure; friable; many fine and medium roots; strongly acid; clear wavy boundary.

Bt1—7 to 18 inches; yellowish red (5YR 4/6) clay; moderate fine and medium subangular blocky structure; firm; common fine and medium roots; common distinct clay films on faces of peds; 2 percent channers; very strongly acid; gradual wavy boundary.

BC—18 to 22 inches; yellowish red (5YR 4/6) clay; moderate medium subangular blocky structure; firm; common fine roots; very strongly acid; gradual wavy boundary.

C—22 to 29 inches; pale olive (5Y 6/3) clay; massive; firm; extremely acid; abrupt wavy boundary.

R—29 inches; hard, black shale.

Thickness of the solum and depth to bedrock range from 20 to 40 inches. Rock fragments consist mainly of shale channers. They range, by volume, from 0 to 35 percent in the solum and to 75 percent in the C horizon. In unlimed areas reaction ranges from extremely acid to strongly acid.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4.

The Bt horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 4 to 8. In some pedons, in the lower part, it is mottled in shades of red or brown. In the fine earth fraction it is silty clay loam, silty clay, or clay.

The BC horizon has colors and textures similar to those in the lower part of the Bt horizon.

The C horizon has a matrix and mottles in shades of red, brown, and gray. In the fine earth fraction it is silty clay, clay, or clay loam.

Trimble Series

The Trimble series consists of very deep, well drained soils that have moderate permeability. These soils formed in residuum of cherty limestone or old sediment deposits from cherty limestone. They are on ridgetops and side slopes on uplands. In some areas they are karst. Slopes range from 2 to 25 percent. Trimble soils are fine-loamy, siliceous, mesic Typic Paleudults.

Trimble soils are on the same landforms as Caneyville, Crider, Dewey, and Lonewood soils. Caneyville soils are moderately deep and fine. Crider soils are fine-silty and have a base saturation of more than 35 percent. Dewey soils are clayey. Lonewood soils contain fewer chert fragments and formed in residuum of siltstone and sandstone.

Typical pedon of Trimble cobbly silt loam, 6 to 12 percent slopes, eroded; Blacks Ferry Quadrangle, latitude 36 degrees 41 minutes 56 seconds N., longitude 85 degrees 26 minutes 28 seconds W.; south of Burkesville, 7.3 miles on Kentucky Highway 61, west 4.6 miles on Kentucky Highway 953, 100 feet north of Kentucky Highway 953, in a field of tobacco:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) cobbly silt loam; moderate medium granular structure; friable; common fine roots; 20 percent chert gravel and cobbles; neutral; abrupt smooth boundary.

Bt1—8 to 26 inches; strong brown (7.5YR 5/6) cobbly loam; weak medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; 30 percent chert gravel and cobbles; moderately acid; clear wavy boundary.

Bt2—26 to 48 inches; strong brown (7.5YR 5/6) cobbly silty clay loam; many coarse prominent brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; firm; many distinct clay films on faces of peds; 20 percent chert gravel and cobbles; moderately acid; clear wavy boundary.

Bt3—48 to 62 inches; reddish yellow (7.5YR 6/8) cobbly silty clay loam; many coarse prominent yellowish red (5YR 5/8) and few medium prominent pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable; few common distinct clay films on faces of peds; 15 percent chert gravel and cobbles; strongly acid.

R—62 inches; hard, gray cherty limestone.

Thickness of the solum and depth to bedrock are 60 inches or more. Rock fragments range from 15 to 50 percent in individual horizons. They make up, on average, less than 35 percent of the particle-size control section. In unlimed areas reaction ranges from extremely acid to strongly acid.

The Ap horizon has hue or 10YR or 7.5YR, value of 4 to 6, and chroma of 4.

Some pedons have an AB or BA horizon that has colors and textures similar to those in the Ap or Bt horizons.

The Bt horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 4 to 8. It is mottled in shades of brown, gray, or red.

In the fine earth fraction it is silt loam, silty clay loam, loam, or clay loam.

Some pedons have a C horizon that has colors and textures similar to those of the Bt horizon.

Waynesboro Series

The Waynesboro series consists of very deep, well drained, moderately permeable soils that formed in old alluvium. These soils are on ridges and side slopes of old, high terraces of the Cumberland River. Slopes range from 6 to 25 percent. Waynesboro soils are clayey, kaolinitic, thermic Typic Paleudults.

Waynesboro soils in this survey area are a taxajunct to the Waynesboro series because clay distribution decreases by more than 20 percent of the maximum within a depth of 60 inches. In use, management, and behavior, they are similar to the Waynesboro series.

Waynesboro soils are on the same landforms as Elk, Holston, Lowell, and Monongahela soils. Elk soils are fine-silty and have a higher base saturation. Holston soils are fine-loamy. Lowell soils are fine and formed in residuum derived from limestone. Monongahela soils are moderately well drained and have a fragipan.

Typical pedon of Waynesboro loam, 6 to 12 percent slopes, eroded; Burkesville Quadrangle, latitude 36 degrees 49 minutes 59 seconds N., longitude 85 degrees

20 minutes 54 seconds W.; east of Burkesville, about 1.4 miles on Kentucky Highway 90, north 4.8 miles on Kentucky Highway 1880, west 0.7 mile on Scotts Bottom Road, 400 feet east of a 90 degree curve in Scotts Bottom Road, in pasture:

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) loam; moderate medium granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

Bt1—6 to 13 inches; strong brown (7.5YR 5/6) clay; common distinct brown (10YR 4/3) coatings on ped faces; moderate fine subangular blocky structure; firm; many fine roots; common distinct clay films on faces of peds and in pores; strongly acid; clear wavy boundary.

Bt2—13 to 36 inches; strong brown (7.5YR 4/6) clay; strong medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds and in pores; very strongly acid; gradual wavy boundary.

Bt3—36 to 58 inches; yellowish red (5YR 5/8) clay loam; many medium distinct reddish brown (5YR 5/4) mottles; strong medium subangular blocky structure; firm; common medium distinct strong brown (7.5YR 4/6) clay films on faces of peds and in pores; very strongly acid; gradual wavy boundary.

BC—58 to 74 inches; strong brown (7.5YR 5/8) loam; weak coarse subangular blocky structure; friable; 2 percent rounded quartz pebbles; very strongly acid.

Thickness of the solum and depth to bedrock are more than 60 inches. Rock fragments consist of rounded or subrounded gravel of quartz or chert. They range, by volume, from 0 to 15 percent throughout. In unlimed areas reaction is strongly acid or very strongly acid.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6.

Some pedons have a BA horizon that has colors and textures similar to those of the Ap and Bt horizons.

The Bt horizon has hue of 7.5YR to 2.5YR, value of 4 or 5, and value of 6 to 8. It is clay loam or clay. In the control section it is about 20 to 40 percent sand.

The BC horizon has colors similar to those of the Bt horizon. The BC horizon is clay loam, loam, sandy clay loam, or sandy loam.

Formation of the Soils

This section describes the major factors and processes that have affected the formation and morphology of soils in the survey area. Soil genesis consists mainly of two broad steps; (1) the accumulation of parent materials, and (2) the differentiation of horizons in the profile (*6,18*).

Factors of Soil Formation

The characteristics of a soil depend upon five major soil forming factors: climate, living organisms, parent material, relief, and time (*13,15,17*). These factors are interrelated and interdependent (*11*). The "Geology and Topography" section gives further information regarding factors of parent material and relief. The section "Processes of Soil Formation" gives detailed information on horizon differentiation.

Parent Material

Parent material is the unconsolidated geologic material from which soils formed. It influences physical and chemical properties of the soil as well as the rate at which formation takes place.

The soils in Cumberland County formed in three main types of parent material. Residuum is parent material derived mainly from the weathering of rocks. Colluvium derived mainly from material that has moved downslope. Alluvium was deposited by rivers and streams. Also, the surface layer and the upper part of the subsoil have been influenced by windblown material.

Residuum is mostly on ridgetops and upper side slopes. It weathered from limestone, sandstone, siltstone, and shale. Dewey, Garmon, Lonewood, Lowell, Faywood, Cynthiana, and Newbern soils formed mainly in residuum.

Colluvium is mostly on lower side slopes, foot slopes, and fans. It was transported downslope by gravity and water. It is generally loamy and contains varying amounts of rock fragments. Carpenter and Renox soils formed mostly in colluvium.

Alluvium is mostly on flood plains and stream terraces. It has been washed from uplands and transported and deposited by streams. Chagrin, Huntington, Grigsby, and Sensabaugh soils formed in relatively recent alluvium on flood plains. Holston, Elk, Monongahela, and Waynesboro soils formed in relatively old alluvium on stream terraces.

Relief

The relief of the landscape influences soil formation in Cumberland County mainly through its effect on drainage, erosion, plant cover, and soil temperature. In areas of moderately steep and steep, unprotected Dewey, Waynesboro, and Holston soils, much of the rainfall leaves the surface as runoff. Water moves through the nearly level Newark and Melvin soils. The seasonal high water table in Newark and Melvin soils is the result partly of relief.

Erosion has a major effect on relief. On sloping to very steep, unprotected soils, runoff carries away valuable topsoil. Erosion can remove soil as fast at it develops. On these soils the infiltration rate is low, thus slowing the process of horizon differentiation. The section "Processes of Horizon Differentiation" gives further information on horizon differentiation.

Temperature plays a major role in the rate of chemical reactions and on the type and growth of vegetation found on different soils. Relief influences temperature mainly by controlling the exposure and angle of the landscape to sunlight. North and east exposures of the landscape tend to be moister and cooler than south and west exposures.

Geology and Topography

Cumberland County is located within the Highland Rim and Pennyroyal Major Land Resource Area (*36*). Elevations below about 700 feet are geologically equivalent to the Nashville Basin or to the Kentucky Bluegrass Major Land Resource Areas (*36*). The county is underlain by mostly flat, bedded sedimentary rocks that are Ordovician, Devonian, and Mississippian in age (table 21). According to the U.S. Geological Survey, the rocks exposed at the surface are predominantly of Mississippian age. However, along the Cumberland River Valley and in the valleys of Bear Creek, Crocus Creek, Big Renox Creek, Little Renox Creek, Mud Camp Creek, and their tributaries, the formations exposed at the surface are

Devonian and Ordovician in age (*42,43,44,45,46,47,48,49,50,51,52*).

The Catheys Limestone is Ordovician in age and is exposed at lower elevations along the Cumberland River in the southwest part of Cumberland County near the Monroe County line. This medium gray, dolomitic limestone is the oldest geologic formation in the county. It ranges to about 20 feet in thickness. Leipers Limestone, also of Ordovician age, overlies the Catheys Limestone. It consists mainly of narrow bands at the base of steep hills along the Cumberland River and its tributaries. It is gray and bluish gray and ranges from 10 to 130 feet in thickness. The Cumberland Formation, also Ordovician in age, overlies Leipers Limestone. It is mostly on steep and very steep hillsides and narrow ridgetops along the Cumberland River and its major tributaries. It consists predominantly of light to medium gray dolomite and limestone and some thin beds of dolomitic siltstone. It ranges from 10 to 130 feet in thickness. Cynthiana and Faywood soils are predominant on the steeper slopes, and Lowell and Faywood soils are predominant in the less sloping areas of all these formations.

The Chattanooga Shale at the top of Cumberland Formation presents a major unconformity. It is Devonian in age and overlies the Cumberland Formation. It underlies shallow and moderately deep soils on steep hillsides, sloping ridges, foot slopes, and flood plains along the tributaries of the Cumberland River. The highest exposure of this formation is above the current drainage system in the southwest part of the county, where the Cumberland River exits the county. This formation then declines in elevation above the drainage system as the stream gradient progresses along the tributary streams. Near the head of most tributaries, it is covered by alluvium and colluvium and is generally not exposed. It consists of thinly laminated layers of black and brown carbonaceous shale. It is about 4 or 5 feet in thickness. Rohan and Trappist soils are predominant on this formation.

The Fort Payne Formation is Mississippian in age and overlies the Chattanooga Shale. It underlies the steep hillsides and narrow ridgetops that border the tributary streams and drainageways. This formation is the lowest member of the formations of Mississippian age. It is light gray to brownish gray calcareous shale and siltstone and has some cherty layers. It also is interbedded with layers of massive reef limestone in various places. Reef limestone is grayish blue to brown and contains many fossils and some chert. It is generally about 10 to 50 feet in thickness, but it ranges close to the entire thickness of the Fort Payne Formation. The Fort Payne Formation ranges in thickness from about 190 to 310 feet. Carpenter and Garmon soils predominate on the lower part of the steep hillsides. Newbern and Garmon soils predominate on the upper part of the steep hillsides and on the narrow, convex ridges. Near the top of the formation in the southern and eastern parts of the county, Caneyville, Crider, Dewey, and Trimble soils predominate on rolling ridgetops.

The Salem and Warsaw Formations are Mississippian in age and overlie the Fort Payne Formation. They underlie rolling ridgetops mainly in the northern, eastern, and southern parts of the county. They are mostly coarse grained limestone in the upper part and brownish gray, fine grained sandstone in the lower part. They range in thickness from about 35 to 140 feet. Dewey and Caneyville soils are predominant in areas of greater influence of limestone. Lonewood soils are predominant in areas of greater influence of sandstone. St. Louis Limestone, also Mississippian in age, overlies the Salem and Warsaw Formations. It underlies convex ridges, which occupy the highest elevations in the northern, eastern, and southern parts of the county. It is medium to dark gray, medium grained limestone that contains local beds of light-colored chert. It ranges from about 50 to 150 feet in thickness. Dewey soils are predominant on St. Louis Limestone.

Alluvial and colluvial soils and terrace deposits are in areas along the Cumberland River and its tributaries. They are of Quaternary age and overlie formations of Ordovician age. Huntington and Grigsby soils predominate on the protected flood plains of the Cumberland River. Chagrin soils predominate on the broad flood plains of tributary streams. Renox and Sensabaugh soils predominate on narrow flood plains, alluvial fans, and foot slopes. Elk, Monongahela, Holston, and Waynesboro soils predominate on the terrace deposits.

Climate

Climate is the most influential factor in soil genesis. Of the numerous climatic factors that contribute to soil formation, temperature and moisture are equally important and easily measurable (*17,35*). Temperature partly controls the rate of chemical reactions. Moisture, as water, helps to transport material from one part of the soil to another. It physically ruptures material when it freezes and it influences the type and rate of chemical reactions (*11,17*).

The soils on uplands in Cumberland County are in the mesic or thermic temperature regime and in the udic moisture regime (*34*). In these soils, temperatures are generally moderate and the upper part of the soil is not dry for more than 90 days during the year. Climate has amplified the weathering processes in Dewey and Lonewood soils. Consequently, the subsoil of these soils show both an increased amount of clay and lower pH levels.

The section “General Nature of the Survey Area” and

Tables 1, 2, and 3 give more detailed information on climate.

Living Organisms

Living organisms actively affect soils formation. They include vegetation, bacteria, fungi, and animals. They may be most active on grasslands or forests. Vegetation generally supplies organic matter, which, decomposed, gives soils a dark colored surface layer. It also transfers or cycles nutrients from the subsoil to the surface layer. Bacteria and fungi decompose the organic matter and release the minerals into the soil. Worms, insects, and burrowing animals mix the soil, and thus affect soil tilth, structure, and porosity.

Human activities, such as tillage and management practices, have affected the physical properties of soil. The use of lime, fertilizer, insecticides, and herbicides alters the chemical makeup of soil. The movement of vehicles causes surface compaction and increases soil density.

Time

Over time, the forces of climate, living organisms, and relief work on parent material and form a soil. The soils of Cumberland County range from relatively young to old. The soils that formed in residuum range from the relatively young Newbern soils to the relatively old Dewey soils. The soils that formed in colluvium, such as Renox and Carpenter soils, range in age between Dewey and Newbern soils. The soils that formed in alluvium range from the relatively young soils on flood plains, such as Chagrin and Sensabaugh soils, to older soils on stream terraces, such as Holston and Waynesboro soils.

In younger soils, the soil structure is weakly developed and the Bw horizon is mostly expressed by soil color. In older soils, the soil structure is well developed and the Bt horizon is expressed by bright colors and by accumulated clay from overlying horizons. The section "Processes of Horizon Differentiation" gives further information on horizon differentiation.

Processes of Horizon Differentiation

The results of the factors of soil formation are the different layers, or horizons, in a profile. The soil profile extends from the surface down to material that is little altered by the soil forming processes.

Most soils have three major horizons—the A, B, and C horizons. Soils under a forest canopy have an O (organic) horizon at the surface. This horizon consists of accumulated organic material, such as twigs and leaves, or of humified organic material that has little admixture of mineral material. Numbers and letters can be used within the major horizons. The Bt horizon, for example, represents the most strongly developed part of a B horizon. It consists of an accumulation of clay from overlying horizons.

The A horizon is a mineral surface layer darkened by humified organic matter. An Ap horizon commonly is a plow layer also darkened by organic matter. The E horizon is a layer of maximum leaching, or eluviation, of clay and iron. If considerable leaching has taken place, an E horizon is formed. This horizon is normally the lightest colored horizon in the profile.

The B horizon, which normally underlies the A horizon, is the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer.

In some soils, such as Chagrin soils, the Bw horizon is formed mainly by the alteration of the original material rather than by illuviation. The alteration can be caused by the weathering of the parent material, the oxidizing of iron to give a brighter color, and the development of soil structure instead of the original rock or sediment structure. The B horizon commonly has a blocky structure. It generally is firmer and lighter in color than the A horizon, but is darker in color than the C or E horizon.

The C horizon is below the A or B horizon. It consists of material that is little altered by the soil forming processes, but it can be modified by weathering.

In young soils, such as Nelse soils, which formed in recent alluvium, the C horizon is near or just below the A horizon. Most young soils do not have a B horizon.

Soil horizons are formed by the accumulation of organic matter, the leaching of soluble constituents, the chemical reduction and movement of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes often take place simultaneously. In old soils they have been going on for thousands of years.

The accumulation and incorporation of organic material takes place as plant residue and applied organic material decompose and are mixed into the soil. These additions darken the mineral material and form the A horizon.

For soils to have a distinct subsoil, they must be leached of carbonates and the more soluble minerals. After leaching, the clay can be translocated more easily and be moved as part of the percolant. Clay has accumulated in the Bt horizon of Ultisols; the clay was leached from the A horizon and deposited in the B horizon as a result of flocculation and of drying of percolating water. Also, clay from dissolved silica and aluminum has accumulated in the B horizon. The more inert material, such as silt- and sand-sized quartz, is concentrated in the A horizon as the more soluble material and clay are leached into the next horizon.

The naturally well drained soils in the survey area generally have a brownish or reddish subsoil. These colors come from finely divided iron oxides that coat sand, silt, or clay particles. These iron oxides formed from iron released during the weathering of silica minerals in the present soils or in the parent material in which the soils developed. Imperfectly drained soils have developed gray or olive mottles and colors. These colors formed from iron and manganese reduced under anaerobic conditions.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces. Warm aspect is slopes of more than 15 percent facing an azimuth of 135 to 315 degrees. Cool aspect is slopes of more than 15 percent facing an azimuth of 315 to 135 degrees.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as:

Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the erosion hazard. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil material. Soil material that is, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chert. An impure, very fine grained siliceous rock frequently associated with limestones, dolomites, and conglomerates.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay activity (clay exchange activity). The amount of cation-exchange capacity based on the amount and kinds of clay (and clay minerals) in the soil, often expressed as a ratio of CEC (pH 7.0) to clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse grained, clastic rock composed of rounded to subangular rock fragments, commonly with a matrix of sand and finer material; cements include silica, calcium carbonate, and iron oxides.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Cool aspect. See "Aspect."

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Deposition. The mechanical settling of sediment from suspension in water.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Devonian. The fourth period of the Paleozioc Era of geologic time extends from the end of the Silurian Period (about 405 million years old) to the beginning of the Mississippian Period (about 345 million years ago).

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Dolomite. Sedimentary rock that is composed chiefly of calcium and magnesium carbonate in the form of the mineral dolomite.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Fissile. A characteristic or quality of any rock that permits its distinct separation into parallel laminae or layers, as in shale.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Headward erosion. The lengthening of a young valley or gulley at the valley head; it is accomplished by rainwash, gullying, spring sapping, and slumping.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, generally expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Knob. A low, rounded hill rising above adjacent landforms. On knobs in Kentucky, shale is commonly the major rock on the side slopes.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Landform. Any physical, recognizable form or feature on the earth's surface, having a characteristic shape, resulting from natural causes, and including major forms, such as a plain, hill, valley, or slope.

Landscape (geology). The distinct associations of landforms, especially as modified by geological forces, that can be seen in a single view.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Limestone. A sedimentary rock consisting chiefly of calcium carbonate, primarily in the form of calcite. Limestone is generally formed by a combination of organic and inorganic processes and includes soluble and insoluble constituents; many limestones contain fossils.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Mississippian. The fifth period of the Paleozoic Era of geologic time extending from the end of the Devonian Period (about 345 million years ago) to the beginning of the Pennsylvianian Period (about 310 million years ago).

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Ordovician. The second period of the Palezoic Era of geologic time, extending from the end of the Cambrian Period (about 500 million years ago) to the beginning of the Silurian Period (about 425 million years ago).

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Low	less than 2.0 percent
Moderate	2.0 to 4.0 percent
High	more than 4.0 percent

Paleozic. The geologic era between the Precambrian and Mesozoic; it covers the period between 600 million and 230 million years ago and was characterized by the development of the first fishes, amphibians, reptiles, and land plants.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Pennsylvanian. The sixth period of the Paleozoic Era of geologic time extending from the end of the Mississippian Period (about 300 million years ago) to the beginning of the Permian Period (about 270 million years ago) and characterized by warm climates and swampy land areas.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Perennial stream. A creek or stream that has flowing water throughout the year.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Quaternary. The second period of the Cenozoic Era of geologic time, extending from the end of the Tertiary period (about 1 million years ago) to the present.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	less than 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Scour. Concentrated erosion action especially by streamwater, as on the outside curve in a bend; also a place in a streambed swept clear by a swift current.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Silurian. The third period of the Paleozoic Era of geologic time, extending from the end of the Ordovician Period (about 425 million years ago) to the beginning of the Devonian Period (about 405 million years ago.)

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 6 percent
Sloping	6 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 30 percent
Very steep	30 to 65 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in layers (strata). The term refers to geologic material. The layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Tertiary. The first period of the Cenozoic Era of geologic time, following the Mesozoic Era and preceding the Quaternary Period (approximately 63 million to 1 million years ago).

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topography. The relative positions and elevations of the natural or manmade features of an area that describe the configuration of its surface.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Warm aspect. See "Aspect."

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-88 at Summer Shade, Kentucky)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	43.6	24.2	33.9	70	-10	18	4.18	1.94	6.11	8	4.9
February----	48.8	27.4	38.1	75	-4	25	4.02	1.87	5.86	7	4.0
March-------	58.2	35.3	46.8	81	13	98	5.00	2.77	6.95	9	1.6
April-------	69.4	44.7	57.1	87	24	232	4.31	2.63	5.81	8	.1
May---------	77.5	53.4	65.5	90	33	481	4.70	2.75	6.43	8	.0
June--------	84.8	61.3	73.1	95	44	693	4.47	2.13	6.48	7	.0
July--------	87.9	65.1	76.5	97	51	822	4.86	2.77	6.70	7	.0
August------	86.8	63.7	75.3	97	48	784	3.31	1.61	4.77	6	.0
September---	80.7	57.4	69.1	94	39	573	3.92	1.69	5.80	6	.0
October-----	69.7	45.0	57.4	87	24	258	2.68	.90	4.14	5	.0
November----	58.0	35.7	46.9	79	13	56	4.51	2.47	6.30	8	.7
December----	48.2	28.7	38.5	71	1	28	4.76	2.40	6.80	8	1.9
Yearly:											
Average---	67.8	45.2	56.5	---	---	---	---	---	---	---	---
Extreme---	---	---	---	99	-12	---	---	---	---	---	---
Total-----	---	---	---	---	---	4068	50.72	43.34	57.79	87	13.2

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-88 at Summer Shade, Kentucky)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 10	Apr. 21	May 7
2 years in 10 later than--	Apr. 5	Apr. 16	May 1
5 years in 10 later than--	Mar. 26	Apr. 7	Apr. 21
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 24	Oct. 14	Oct. 4
2 years in 10 earlier than--	Oct. 30	Oct. 20	Oct. 9
5 years in 10 earlier than--	Nov. 9	Oct. 30	Oct. 18

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-88 at Summer Shade, Kentucky)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	206	186	159
8 years in 10	213	192	166
5 years in 10	226	205	179
2 years in 10	240	218	192
1 year in 10	247	225	199

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
CaD2	Caneyville-Lonewood complex, rocky, 6 to 25 percent slopes, eroded	7,830	3.9
Cg	Chagrin loam, occasionally flooded	4,945	2.5
CrB	Crider silt loam, 2 to 6 percent slopes	155	0.1
CrC2	Crider silt loam, 6 to 12 percent slopes, eroded	260	0.1
CyF2	Cynthiana-Faywood-Rock outcrop complex, 12 to 50 percent slopes, eroded	9,765	4.9
DeB	Dewey loam, 2 to 6 percent slopes	350	0.2
DeC2	Dewey loam, 6 to 12 percent slopes, eroded	4,070	2.1
DeD2	Dewey loam, 12 to 25 percent slopes, eroded	4,225	2.1
DmD	Dewey-Lonewood complex, 12 to 25 percent slopes	13,665	6.9
Eg	Egam silty clay loam, rarely flooded	125	0.1
EkA	Elk silt loam, 0 to 2 percent slopes	265	0.1
EkB	Elk silt loam, 2 to 6 percent slopes	2,285	1.2
EkC2	Elk silt loam, 6 to 12 percent slopes, eroded	830	0.4
EkD2	Elk silt loam, 12 to 25 percent slopes, eroded	120	0.1
FcC2	Faywood-Cynthiana complex, rocky, 6 to 12 percent slopes, eroded	530	0.3
FcD2	Faywood-Cynthiana complex, rocky, 12 to 25 percent slopes, eroded	2,015	1.0
GcF	Garmon-Carpenter-Newburn complex, rocky, 30 to 65 percent slopes	80,975	40.7
Gr	Grigsby fine sandy loam	1,035	0.5
HoB	Holston silt loam, 2 to 6 percent slopes	895	0.4
HoC2	Holston silt loam, 6 to 12 percent slopes, eroded	1,520	0.8
HsD2	Holston-Waynesboro complex, 12 to 35 percent slopes, eroded	1,670	0.8
Hu	Huntington silt loam, overwash	2,015	1.0
La	Lawrence silt loam, 0 to 4 percent slopes	935	0.5
LdB	Lonewood silt loam, 2 to 6 percent slopes	605	0.3
LdC2	Lonewood silt loam, 6 to 12 percent slopes, eroded	3,280	1.7
LoB	Lowell silt loam, 2 to 6 percent slopes	165	0.1
LoC2	Lowell silt loam, 6 to 12 percent slopes, eroded	1,315	0.7
LoD2	Lowell silt loam, 12 to 25 percent slopes, eroded	1,270	0.6
Me	Melvin silt loam, occasionally flooded	850	0.4
MnB	Monongahela silt loam, 2 to 6 percent slopes	2,160	1.1
MnC2	Monongahela silt loam, 6 to 12 percent slopes, eroded	210	0.1
NeD	Nelse fine sandy loam, 10 to 25 percent slopes, frequently flooded	2,000	1.0
Nk	Newark silt loam, occasionally flooded	1,670	0.8
NrE	Newbern-Garmon complex, very rocky, 12 to 60 percent slopes	12,925	6.5
ReC2	Renox gravelly loam, 6 to 12 percent slopes, eroded	4,595	2.3
ReD2	Renox gravelly loam, 12 to 25 percent slopes, eroded	770	0.4
RfF2	Renox-Faywood complex, 20 to 50 percent slopes, eroded	9,695	4.9
RoF3	Rohan channery silt loam, 20 to 50 percent slopes, gullied	4,005	2.0
Se	Sensabaugh gravelly loam, 0 to 4 percent slopes, occasionally flooded	3,720	1.9
SgB	Sensabaugh gravelly loam, 2 to 6 percent slopes	1,670	0.8
St	Stokly sandy loam, occasionally flooded	315	0.2
TeB	Teddy loam, 1 to 6 percent slopes	385	0.2
ToC2	Trappist silt loam, 6 to 12 percent slopes, eroded	105	0.1
TpD2	Trappist-Rohan complex, rocky, 12 to 25 percent slopes, eroded	220	0.1
TrB	Trimble cobbly silt loam, 2 to 6 percent slopes	77	*
TrC2	Trimble cobbly silt loam, 6 to 12 percent slopes, eroded	860	0.4
TrD2	Trimble cobbly silt loam, 12 to 25 percent slopes, eroded	670	0.3
WaC2	Waynesboro loam, 6 to 12 percent slopes, eroded	805	0.4
	Water, in large areas	4,070	2.0
	Total	198,892	100.0

* Less than 0.1 percent.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Tobacco	Soybeans	Wheat	Grass-legume hay	Alfalfa hay	Pasture
		Bu	Lb	Bu	Bu	Ton	Ton	AUM*
CaD2------------ Caneyville-Lonewood	VIs	---	---	---	---	2.5	---	5.0
Cg-------------- Chagrin	IIw	125	3,000	40	45	4.0	5.0	8.0
CrB------------- Crider	IIe	100	2,700	45	55	4.5	5.0	8.0
CrC2------------ Crider	IIIe	90	2,500	35	40	3.5	4.0	8.0
CyF2**---------- Cynthiana-Faywood-	VIIe	---	---	---	---	---	---	3.5
Rock outcrop	VIIIe	---	---	---	---	---	---	---
DeB------------- Dewey	IIe	90	2,800	35	40	4.0	4.5	7.5
DeC2------------ Dewey	IIIe	80	2,400	30	30	3.5	4.0	6.5
DeD2------------ Dewey	IVe	70	2,000	25	25	3.0	3.5	5.5
DmD------------- Dewey-Lonewood	IVe	60	---	---	---	3.0	---	5.5
Eg-------------- Egam	IIw	110	2,800	40	45	4.0	5.0	8.0
EkA------------- Elk	I	130	3,200	45	50	4.0	5.0	9.0
EkB------------- Elk	IIe	125	3,200	45	45	4.0	5.0	9.0
EkC2------------ Elk	IIIe	95	2,500	35	40	3.5	4.0	8.0
EkD2------------ Elk	IVe	80	2,400	30	35	3.0	3.5	7.0
FcC2, FcD2------ Faywood-Cynthiana	VIs	---	---	---	---	---	---	4.0
GcF------------- Garmon-Carpenter-Newbern	VIIe	---	---	---	---	---	---	3.5

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Tobacco	Soybeans	Wheat	Grass-legume hay	Alfalfa hay	Pasture
		Bu	Lb	Bu	Bu	Ton	Ton	AUM*
Gr-------------- Grigsby	I	120	3,000	40	45	4.0	4.5	8.0
HoB------------- Holston	IIe	100	2,800	40	45	4.0	4.5	8.0
HoC2------------ Holston	IIIe	90	2,600	30	35	3.5	4.0	7.5
HsD2------------ Holston-Waynesboro	IVe	70	2,000	25	30	3.0	3.5	6.0
Hu-------------- Huntington	I	130	3,200	45	50	4.0	5.0	8.0
La-------------- Lawrence	IIIw	80	1,700	35	30	2.5	3.0	5.5
LdB------------- Lonewood	IIe	90	2,500	35	40	4.0	4.5	7.5
LdC2------------ Lonewood	IIIe	80	2,400	30	35	3.5	4.0	6.5
LoB------------- Lowell	IIe	100	2,900	35	40	4.0	4.5	8.0
LoC2------------ Lowell	IIIe	90	2,400	30	35	3.5	4.0	7.0
LoD2------------ Lowell	IVe	80	2,100	25	30	3.0	3.5	5.0
Me-------------- Melvin	IIIw	80	---	35	---	3.5	---	7.0
MnB------------- Monongahela	IIe	90	2,200	35	40	3.0	3.5	7.0
MnC2------------ Monongahela	IIIe	85	2,000	30	35	3.0	3.0	6.5
NeD------------- Nelse	VIe	---	---	---	---	3.0	---	6.0
Nk-------------- Newark	IIw	95	1,700	35	40	3.5	---	8.5
NrE------------- Newbern-Garmon	VIIe	---	---	---	---	---	---	3.5
ReC2------------ Renox	IIIe	90	2,600	35	35	3.0	4.0	7.5
ReD2------------ Renox	IVe	75	2,100	30	30	2.5	3.5	7.0

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Tobacco	Soybeans	Wheat	Grass-legume hay	Alfalfa hay	Pasture
		Bu	Lb	Bu	Bu	Ton	Ton	AUM*
RfF2------------ Renox-Faywood	VIIe	---	---	---	---	---	---	5.0
RoF3------------ Rohan	VIIe	---	---	---	---	---	---	2.5
Se-------------- Sensabaugh	IIw	100	2,400	40	45	4.0	4.5	7.0
SgB------------- Sensabaugh	IIe	100	2,400	40	45	4.0	4.5	7.0
St-------------- Stokly	IIw	90	2,000	35	40	4.0	4.5	7.0
TeB------------- Teddy	IIe	85	2,200	35	40	3.5	4.0	6.5
ToC2------------ Trappist	IIIe	70	2,200	25	30	3.5	4.0	6.0
TpD2------------ Trappist-Rohan	VIs	---	---	---	---	---	---	4.0
TrB------------- Trimble	IIe	95	2,600	35	35	3.0	4.0	6.0
TrC2------------ Trimble	IIIe	85	2,200	30	30	3.0	4.0	6.0
TrD2------------ Trimble	IVe	70	2,100	25	30	2.5	3.5	5.0
WaC2------------ Waynesboro	IIIe	80	2,400	30	40	3.5	4.0	5.5

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	3,315	---	---	---
II	19,522	8,747	10,775	---
III	19,635	17,850	1,785	---
IV	22,390	22,390	---	---
V	---	---	---	---
VI	12,595	2,000	---	10,595
VII	115,895	115,895	---	---
VIII	1,470	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume	Trees to plant
CaD2**:								
Caneyville	Severe	Moderate	Moderate	Severe	Black oak	65	47	Virginia pine, white oak.
					White oak	60	43	
					Sugar maple	---	--	
					Hickory	---	--	
					Eastern redcedar	36	38	
					Chinkapin oak	44	29	
					Scarlet oak	50	34	
Lonewood	Moderate	Moderate	Slight	Severe	Shortleaf pine	70	110	Loblolly pine, shortleaf pine, eastern white pine.
					Virginia pine	70	109	
					White oak	70	52	
					Black oak	---	--	
Cg Chagrin	Slight	Slight	Moderate	Severe	Northern red oak	75	51	Eastern white pine, black walnut, yellow poplar, white ash, northern red oak, white oak.
					Yellow poplar	85	81	
					Sugar maple	86	--	
					White oak	---	--	
					Black cherry	---	--	
					White ash	92	--	
					Black walnut	---	--	
CrB, CrC2 Crider	Slight	Slight	Slight	Severe	Yellow poplar	97	102	Eastern white pine, yellow poplar, black walnut, loblolly pine, white ash, northern red oak, white oak, shortleaf pine.
					Sugar maple	---	--	
					Black oak	84	66	
					White ash	---	--	
					Black walnut	---	--	
					White oak	72	54	
					Hickory	---	--	
					Northern red oak	84	66	
CyF2**:								
Cynthiana	Severe	Severe	Moderate	Moderate	Eastern redcedar	42	--	Virginia pine white oak, white ash.
					White ash	75	--	
					Black walnut	71	--	
					Hackberry	---	--	
					Chinkapin oak	---	--	
					American elm	---	--	
					Honeylocust	---	--	
					Black locust	---	--	
					Black cherry	---	--	
Faywood	Severe	Severe	Slight	Moderate	Northern red oak	70	52	Eastern white pine, white oak, white ash, northern red oak.
					Scarlet oak	72	54	
					Hickory	---	--	
					White ash	---	--	
					Chinkapin oak	---	--	
					Sugar maple	---	--	
					Southern red oak	---	--	
					White oak	60	43	
Rock outcrop.								

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Volume	
DeB, DeC2, DeD2-- Dewey	Slight	Moderate	Slight	Severe	Yellow poplar-------	90	90	Yellow poplar, loblolly pine, eastern white pine, white oak, northern red oak.
					Black oak-----------	---	--	
					Southern red oak----	---	--	
					Black walnut--------	---	--	
					Eastern redcedar----	50	64	
					Hickory-------------	---	--	
DmD**:								
Dewey----------	Moderate	Moderate	Slight	Severe	Yellow poplar-------	90	90	
					Black oak-----------	---	--	
					Southern red oak----	---	--	
					Black walnut--------	---	--	
					Eastern redcedar----	50	64	
					Hickory-------------	---	--	
Lonewood-------	Moderate	Moderate	Slight	Severe	Loblolly pine-------	80	8	Loblolly pine, shortleaf pine, Virginia pine, eastern white pine.
					Shortleaf pine------	70	8	
					Virginia pine-------	70	8	
					White oak-----------	70	4	
					Eastern white pine--	80	10	
Eg-------------- Egam	Slight	Moderate	Moderate	Severe	Yellow poplar-------	100	107	Yellow poplar, black walnut, loblolly pine, white ash, eastern white pine.
					Loblolly pine-------	90	131	
					Southern red oak----	90	72	
					Sweetgum------------	95	122	
EkA, EkB, EkC2-- Elk	Slight	Slight	Slight	Severe	Yellow poplar-------	91	92	Eastern white pine, yellow poplar, black walnut, loblolly pine, white oak, northern red oak, white ash, shortleaf pine.
					Pin oak-------------	96	--	
					Hackberry-----------	---	93	
					Red maple-----------	---	--	
					American sycamore---	---	--	
					Black walnut--------	---	--	
					Sweetgum------------	98	132	
EkD2------------ Elk	Moderate	Moderate	Slight	Severe	Yellow poplar-------	91	92	Eastern white pine, yellow poplar, black walnut, loblolly pine, white oak, northern red oak, white ash, shortleaf pine.
					Pin oak-------------	---	--	
					Hackberry-----------	96	93	
					Red maple-----------	---	--	
					American sycamore---	---	--	
					Black walnut--------	---	--	
					Sweetgum------------	98	132	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume	Trees to plant
FcC2**:								
Faywood--------	Slight	Moderate	Slight	Moderate	Northern red oak----	70	52	Eastern white pine, white oak, white ash, northern red oak.
					Scarlet oak---------	72	54	
					Hickory-------------	---	--	
					White ash-----------	---	--	
					Chinkapin oak-------	---	--	
					Sugar maple---------	---	--	
					Southern red oak----	---	--	
					White oak-----------	60	43	
Cynthiana------	Slight	Moderate	Moderate	Moderate	Eastern redcedar----	42	46	Virginia pine, white oak, white ash.
					White ash-----------	75	--	
					Black walnut--------	71	--	
					Hackberry-----------	---	--	
					Chinkapin oak-------	---	--	
					American elm--------	---	--	
					Honeylocust---------	---	--	
					Black locust--------	---	--	
					Black cherry--------	---	--	
FcD2**:								
Faywood--------	Moderate	Moderate	Slight	Moderate	Northern red oak----	70	52	Eastern white pine, white oak, white ash, northern red oak.
					Scarlet oak---------	72	54	
					Hickory-------------	---	--	
					White ash-----------	---	--	
					Chinkapin oak-------	---	--	
					Sugar maple---------	---	--	
					Southern red oak----	---	--	
					White oak-----------	60	43	
Cynthiana------	Moderate	Moderate	Moderate	Moderate	Eastern redcedar----	42	46	Virginia pine, white oak, white ash.
					White ash-----------	75	--	
					Black walnut--------	71	--	
					Hackberry-----------	---	--	
					Chinkapin oak-------	---	--	
					American elm--------	---	--	
					Honeylocust---------	---	--	
					Black locust--------	---	--	
					Black cherry--------	---	--	
GcF**:								
Garmon--------- (warm aspect)	Severe	Severe	Severe	Moderate	Chestnut oak--------	60	43	Virginia pine, white oak.
					White oak-----------	60	43	
					Black oak-----------	68	50	
					Hickory-------------	---	--	
					Eastern redcedar----	38	40	
					Sugar maple---------	---	--	
Carpenter------ (warm aspect)	Severe	Severe	Moderate	Severe	Virginia pine-------	64	98	Shortleaf pine, white oak.
					White oak-----------	58	41	
					Scarlet oak---------	63	3	
					Black oak-----------	---	--	
					Chestnut oak--------	58	41	
					Hickory-------------	---	--	
					Post oak------------	---	--	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Volume	
GcF**: Newbern (warm aspect)	Severe	Severe	Severe	Moderate	Scarlet oak	55	38	Virginia pine, shortleaf pine, eastern white pine.
					Virginia pine	55	80	
GcF**: Garmon (cool aspect)	Severe	Severe	Slight	Moderate	Yellow poplar	99	105	Yellow poplar, white ash, white oak, northern red oak, eastern white pine.
					White oak	75	57	
					Northern red oak	72	54	
					Hickory	---	--	
					Sugar maple	---	--	
					Chestnut oak	65	47	
					Red maple	---	--	
Carpenter (cool aspect)	Severe	Severe	Slight	Severe	Virginia pine	74	114	Yellow poplar, black walnut, northern red oak, white oak, eastern white pine, shortleaf pine, white ash.
					Black oak	73	55	
					White oak	71	53	
					Chestnut oak	70	52	
					Hickory	---	--	
					Scarlet oak	75	57	
					Northern red oak	70	52	
Newbern (cool aspect)	Severe	Severe	Severe	Moderate	Scarlet oak	65	47	Virginia pine, shortleaf pine, eastern white pine.
					Virginia pine	65	100	
Gr Grigsby	Slight	Slight	Slight	Severe	Yellow poplar	110	124	Yellow poplar, black walnut, eastern white pine, shortleaf pine, white oak, northern red oak, white ash.
					Northern red oak	85	67	
					White oak	85	67	
					Black walnut	---	--	
					American sycamore	---	--	
					Sweetgum	---	--	
					Red maple	---	--	
					Hickory	---	--	
HoB, HoC2 Holston	Slight	Slight	Slight	Severe	Yellow poplar	86	82	Yellow poplar, shortleaf pine, loblolly pine, black walnut, eastern white pine, northern red oak.
					Northern red oak	78	60	
					Shortleaf pine	69	108	
HsD2: Holston (cool aspect)	Moderate	Moderate	Slight	Moderate	Yellow poplar	86	82	Yellow poplar, eastern white pine, northern red oak.
					Northern red oak	69	82	
					Shortleaf pine	69	140	
Waynesboro (cool aspect)	Moderate	Moderate	Slight	Moderate	Northern red oak	70	54	Shortleaf pine loblolly pine, black walnut.
					White oak	70	43	
					Loblolly pine	80	110	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume	Trees to plant
HsD2:								
Holston (warm aspect)	Moderate	Moderate	Moderate	Moderate	Northern red oak	60	46	Loblolly pine, shortleaf pine.
					Shortleaf pine	60	125	
Waynesboro (warm aspect)	Moderate	Moderate	Moderate	Moderate	Northern red oak	60	46	Shortleaf pine, Virginia pine.
					Loblolly pine	70	100	
					Shortleaf pine	60	125	
Hu Huntington	Slight	Slight	Slight	Severe	Northern red oak	85	--	Yellow poplar, black walnut, eastern white pine, white ash, northern red oak.
					Yellow poplar	95	98	
					White oak	---	--	
					Black walnut	---	--	
La Lawrence	Slight	Moderate	Moderate	Severe	Yellow poplar	85	81	Yellow poplar, green ash, American sycamore, white oak, sweetgum, willow oak, eastern white pine.
					Sweetgum	89	103	
					White oak	74	56	
					Black oak	78	60	
					Willow oak	76	68	
					Red maple	---	--	
					Pin oak	---	--	
					Hackberry	---	--	
					American beech	---	--	
					Southern red oak	---	--	
					Blackgum	---	--	
LdB, LdC2 Lonewood	Slight	Slight	Slight	Severe	Shortleaf pine	70	110	Loblolly pine, shortleaf pine, Virginia pine, eastern white pine.
					Virginia pine	70	109	
					White oak	70	52	
					Black oak	---	--	
LoB, LoC2 Lowell	Slight	Slight	Slight	Severe	Black oak	88	70	White ash, eastern white pine, white oak, northern red oak, yellow poplar.
					White ash	75	--	
					Hickory	---	--	
					Virginia pine	78	119	
					Black locust	74	--	
					Sugar maple	---	--	
					Northern red oak	---	--	
					Chinkapin oak	87	63	
LoD2 Lowell	Moderate	Moderate	Slight	Severe	Black oak	88	70	White ash, eastern white pine, white oak, northern red oak, yellow poplar.
					White ash	75	--	
					Hickory	---	--	
					Virginia pine	78	119	
					Black locust	74	--	
					Sugar maple	---	--	
					Northern red oak	---	--	
					Chinkapin oak	87	63	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Volume	
Me-------------- Melvin	Slight	Moderate	Moderate	Severe	Pin oak------------	99	98	Pin oak, American sycamore, sweetgum, loblolly pine, willow oak, green ash.
					Sweetgum-----------	89	103	
					Green ash----------	---	--	
					Hackberry----------	---	--	
					Hickory------------	---	--	
					Red maple----------	---	--	
					American elm--------	---	--	
					Black willow--------	---	--	
MnB, MnC2------- Monongahela	Slight	Slight	Slight	Moderate	Northern red oak----	70	52	Eastern white pine, yellow poplar, white oak, shortleaf pine, northern red oak.
					Yellow poplar-------	85	81	
					Eastern white pine--	72	126	
					Virginia pine-------	66	102	
					White ash----------	---	--	
					Black walnut--------	---	--	
NeD------------- Nelse	Moderate	Moderate	Moderate	Severe	Sweetgum-----------	98	132	Green ash, American sycamore, sweetgum.
					Boxelder-----------	---	--	
					Silver maple--------	---	--	
					Black willow--------	---	--	
					River birch---------	---	--	
					Green ash----------	---	--	
					American sycamore---	---	--	
Nk-------------- Newark	Slight	Moderate	Moderate	Severe	Pin oak------------	100	98	Sweetgum, American sycamore, green ash.
					Sweetgum-----------	85	93	
					Green ash----------	---	--	
					Shumard oak---------	---	--	
					Overcup oak---------	---	--	
NrE**:								
Newbern--------	Moderate	Moderate	Severe	Moderate	Scarlet oak---------	55	38	Virginia pine, shortleaf pine, eastern white pine.
					Virginia pine-------	55	80	
Garmon---------	Moderate	Moderate	Moderate	Moderate	Chestnut oak--------	60	43	Virginia pine, white oak.
					White oak----------	60	43	
					Black oak----------	68	50	
					Hickory------------	---	--	
					Eastern redcedar----	38	40	
					Sugar maple---------	---	--	
ReC2------------ Renox	Slight	Slight	Slight	Severe	Yellow poplar-------	94	97	Yellow poplar, northern red oak, white oak, white ash, black walnut, eastern white pine.
					Northern red oak----	75	57	
					White oak----------	76	58	
					White ash----------	---	--	
					Black walnut--------	---	--	
					American beech------	---	--	
					Sugar maple---------	---	--	
					Red maple----------	---	--	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume	Trees to plant
ReD2------------ Renox	Slight	Moderate	Slight	Severe	Yellow poplar-------	94	97	Yellow poplar, northern red oak, white oak, white ash, black walnut, eastern white pine.
					Northern red oak----	75	57	
					White oak-----------	76	58	
					White ash-----------	---	--	
					Black walnut--------	---	--	
					American beech------	---	--	
					Sugar maple---------	---	--	
					Hickory-------------	---	--	
					Red maple-----------	---	--	
RfF2**:								
Renox----------	Moderate	Severe	Slight	Severe	Yellow poplar-------	94	97	Yellow poplar, northern red oak, white oak, white ash, black walnut, eastern white pine.
					Northern red oak----	75	57	
					White oak-----------	76	58	
					White ash-----------	---	--	
					Black walnut--------	---	--	
					American beech------	---	--	
					Sugar maple---------	---	--	
					Hickory-------------	---	--	
					Red maple-----------	---	--	
Faywood--------	Severe	Severe	Slight	Moderate	Northern red oak----	70	52	White oak, eastern white pine, white ash, northern red oak.
					Scarlet oak---------	72	54	
					White oak-----------	60	43	
					Hickory-------------	---	--	
					White ash-----------	---	--	
					Chinkapin oak-------	---	--	
					Sugar maple---------	---	--	
					Southern red oak----	---	--	
RoF3------------ Rohan	Severe	Severe	Moderate	Slight	Chestnut oak--------	52	36	Virginia pine, shortleaf pine.
					Virginia pine-------	52	36	
					Scarlet oak---------	53	37	
					White oak-----------	---	--	
					Shortleaf pine------	---	--	
Se-------------- Sensabaugh	Slight	Slight	Moderate	Severe	Yellow poplar-------	100	107	Yellow poplar, black walnut, white oak, white ash.
					White oak-----------	80	62	
					Virginia pine-------	75	115	
SgB------------- Sensabaugh	Slight	Slight	Slight	Severe	Yellow poplar-------	100	107	Yellow poplar, black walnut, white oak, white ash.
					White oak-----------	80	62	
					Virginia pine-------	75	115	
St-------------- Stokly	Slight	Moderate	Moderate	Severe	Yellow poplar-------	90	90	Eastern white pine, American sycamore, sweetgum, yellow poplar.
					White oak-----------	80	62	
					Black oak-----------	80	62	
					Red maple-----------	---	--	
					American sycamore---	---	--	
					White ash-----------	---	--	
					River birch---------	---	--	
					Sweetgum------------	---	--	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume	Trees to plant
TeB-------------Teddy	Slight	Slight	Slight	Severe	Yellow poplar-------	103	112	Yellow poplar, eastern white pine, shortleaf pine, white oak, loblolly pine.
					Black oak-----------	73	55	
					American beech------	---	--	
					Southern red oak----	---	--	
					Sugar maple---------	---	--	
					Eastern redcedar----	---	--	
ToC2------------Trappist	Slight	Moderate	Slight	Moderate	Virginia pine-------	62	95	Virginia pine, white oak.
					White oak-----------	60	43	
					Hickory-------------	---	--	
					Black oak-----------	62	45	
					Red maple-----------	---	--	
					Eastern redcedar----	---	--	
					Chestnut oak--------	58	41	
					Scarlet oak---------	---	--	
TpD2**:								
Trappist-------	Moderate	Moderate	Moderate	Moderate	Virginia pine-------	62	45	Virginia pine, white oak, northern red oak.
					White oak-----------	60	43	
					Hickory-------------	---	--	
					Black oak-----------	62	45	
					Red maple-----------	---	--	
					Eastern redcedar----	---	--	
					Chestnut oak--------	58	41	
					Scarlet oak---------	---	--	
Rohan.								
TrB, TrC2-------Trimble	Slight	Slight	Slight	Severe	Yellow poplar-------	99	105	Eastern white pine, black walnut, shortleaf pine, white oak, northern red oak.
					Red maple-----------	---	--	
					Shagbark hickory----	---	--	
					White oak-----------	59	42	
					Scarlet oak---------	70	52	
					Black oak-----------	68	50	
					Hickory-------------	---	--	
TrD2------------Trimble	Moderate	Moderate	Slight	Severe	Yellow poplar-------	99	105	Eastern white pine, black walnut, shortleaf pine, white oak, northern red oak.
					Red maple-----------	---	--	
					Shagbark hickory----	---	--	
					White oak-----------	59	42	
					Scarlet oak---------	70	52	
					Black oak-----------	68	50	
					Hickory-------------	---	--	
WaC2------------Waynesboro	Slight	Slight	Slight	Severe	Yellow poplar-------	85	81	Yellow poplar, shortleaf pine, loblolly pine, white oak, eastern white pine.
					Southern red oak----	---	--	
					White oak-----------	75	57	
					Virginia pine-------	76	117	
					Sugar maple---------	---	--	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CaD2*:					
Caneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Lonewood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Cg Chagrin	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
CrB Crider	Slight	Slight	Moderate: slope.	Slight	Slight.
CrC2 Crider	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
CyF2*:					
Cynthiana	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, depth to rock.
Faywood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Rock outcrop.					
DeB Dewey	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
DeC2 Dewey	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
DeD2 Dewey	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
DmD*:					
Dewey	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Lonewood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Eg Egam	Severe: flooding.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Slight.
EkA Elk	Slight	Slight	Slight	Severe: erodes easily.	Slight.
EkB Elk	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
EkC2 Elk	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
EkD2------------------ Elk	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
FcC2*:					
Faywood--------------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: large stones, slope, depth to rock.
Cynthiana------------	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones.	Moderate--------	Severe: depth to rock.
FcD2*:					
Faywood--------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Cynthiana------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate--------	Severe: slope, thin layer.
GcF*:					
Garmon---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Carpenter------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Newbern--------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Gr------------------- Grigsby	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
HoB------------------ Holston	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
HoC2----------------- Holston	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
HsD2*:					
Holston--------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Waynesboro-----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Hu------------------- Huntington	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
La------------------- Lawrence	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Severe: erodes easily.	Moderate: wetness.
LdB------------------ Lonewood	Slight----------	Slight----------	Moderate: slope.	Severe: erodes easily.	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
LdC2------------------ Lonewood	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
LoB------------------- Lowell	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
LoC2------------------ Lowell	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
LoD2------------------ Lowell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Me-------------------- Melvin	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
MnB------------------- Monongahela	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Severe: erodes easily.	Moderate: wetness.
MnC2------------------ Monongahela	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
NeD------------------- Nelse	Severe: flooding, slope.	Severe: slope.	Severe: slope, flooding.	Moderate: slope, flooding.	Severe: flooding, slope.
Nk-------------------- Newark	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
NrE*:					
Newbern---------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: slope, depth to rock.
Garmon----------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
ReC2------------------ Renox	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, slope.
ReD2------------------ Renox	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
RfF2*:					
Renox-----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Faywood---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
RoF3: Rohan	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Se: Sensabaugh	Severe: flooding.	Slight	Moderate: small stones, slope.	Slight	Moderate: small stones, flooding.
SgB: Sensabaugh	Slight	Slight	Severe: small stones.	Slight	Moderate: small stones, large stones.
St: Stokly	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
TeB: Teddy	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.
ToC2: Trappist	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.
TpD2*:					
Trappist	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Rohan	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: slope, depth to rock.
TrB: Trimble	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
TrC2: Trimble	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
TrD2: Trimble	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
WaC2: Waynesboro	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
CaD2*:										
Caneyville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Lonewood	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Cg Chagrin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CrB Crider	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CrC2 Crider	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CyF2*:										
Cynthiana	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Faywood	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Rock outcrop.										
DeB Dewey	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DeC2 Dewey	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
DeD2 Dewey	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
DmD*:										
Dewey	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lonewood	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Eg Egam	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
EkA, EkB Elk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EkC2 Elk	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
EkD2 Elk	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
FcC2*, FcD2*:										
Faywood	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Cynthiana	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
GcF*:										
Garmon	Very poor.	Poor	Good	Good	---	Very poor.	Very poor.	Poor	Fair	Very poor.
Carpenter	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Newbern	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Gr Grigsby	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HoB Holston	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HoC2 Holston	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HsD2*:										
Holston	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Waynesboro	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Hu Huntington	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
La Lawrence	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
LdB Lonewood	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LdC2 Lonewood	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LoB Lowell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LoC2 Lowell	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LoD2 Lowell	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Me Melvin	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
MnB----------------- Monongahela	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MnC2---------------- Monongahela	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
NeD----------------- Nelse	Poor	Fair	Good	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.
Nk------------------ Newark	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
NrE*:										
Newbern------------	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Garmon------------	Very poor.	Fair	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
ReC2---------------- Renox	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ReD2---------------- Renox	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RfF2*:										
Renox-------------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Faywood-----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RoF3---------------- Rohan	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Se, SgB------------- Sensabaugh	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
St------------------ Stokly	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
TeB----------------- Teddy	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ToC2---------------- Trappist	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TpD2*:										
Trappist----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rohan-------------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.
TrB----------------- Trimble	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
TrC2---------------- Trimble	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TrD2---------------- Trimble	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WaC2---------------- Waynesboro	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CaD2*:						
Caneyville------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: low strength, slope, depth to rock.	Severe: slope, depth to rock.
Lonewood--------	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
Cg--------------- Chagrin	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
CrB-------------- Crider	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Severe: low strength.	Slight.
CrC2------------- Crider	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
CyF2*:						
Cynthiana-------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: slope, depth to rock.
Faywood---------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Rock outcrop.						
DeB-------------- Dewey	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Slight.
DeC2------------- Dewey	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
DeD2------------- Dewey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
DmD*:						
Dewey-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lonewood--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Eg: Egam	Moderate: too clayey, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
EkA: Elk	Slight	Slight	Slight	Slight	Severe: low strength.	Slight.
EkB: Elk	Slight	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
EkC2: Elk	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
EkD2: Elk	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
FcC2*:						
Faywood	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope, depth to rock.
Cynthiana	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, low strength.	Severe: depth to rock.
FcD2*:						
Faywood	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Cynthiana	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: slope, depth to rock.
GcF*:						
Garmon	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Carpenter	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope. slippage.	Severe: slope, slippage.
Newbern	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Gr: Grigsby	Moderate: wetness.	Slight	Slight	Slight	Slight	Slight.
HoB: Holston	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
HoC2: Holston	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HsD2*:						
Holston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Waynesboro	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hu Huntington	Slight	Slight	Slight	Slight	Severe: frost action.	Slight.
La Lawrence	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
LdB Lonewood	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Severe: low strength.	Slight.
LdC2 Lonewood	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
LoB Lowell	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
LoC2 Lowell	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
LoD2 Lowell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Me Melvin	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
MnB Monongahela	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: wetness.
MnC2 Monongahela	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: wetness, slope.
NeD Nelse	Severe: cutbanks cave, slope, slippage.	Severe: flooding, slope, slippage.	Severe: flooding, slope, slippage.	Severe: flooding, slope, slippage.	Severe: slope, flooding, slippage.	Severe: flooding, slope. slippage.
Nk Newark	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
NrE*:						
Newbern	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Garmon	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
ReC2 Renox	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: small stones, slope.
ReD2 Renox	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RfF2*:						
Renox	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.
Faywood	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
RoF3 Rohan	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Se Sensabaugh	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: small stones, flooding.
SgB Sensabaugh	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope.	Slight	Moderate: small stones, large stones.
St Stokly	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness.
TeB Teddy	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.	Slight.
ToC2 Trappist	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
TpD2*:						
Trappist	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Rohan	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
TrB: Trimble	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.	Moderate: small stones.
TrC2: Trimble	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Moderate: small stones, slope.
TrD2: Trimble	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WaC2: Waynesboro	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CaD2*:					
Caneyville	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, slope.
Lonewood	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: depth to rock, too clayey, slope.
Cg Chagrin	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Fair: thin layer.
CrB Crider	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
CrC2 Crider	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
CyF2*:					
Cynthiana	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Faywood	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Rock outcrop.					
DeB Dewey	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
DeC2 Dewey	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
DeD2 Dewey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
DmD*:					
Dewey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
DmD*:					
Lonewood	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Eg Egam	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
EkA Elk	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
EkB Elk	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
EkC2 Elk	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
EkD2 Elk	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
FcC2*:					
Faywood	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, slope.
Cynthiana	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, slope.
FcD2*:					
Faywood	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, slope.
Cynthiana	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, slope.
GcF*:					
Garmon	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage, slope.	Severe: slope, seepage, depth to rock.	Poor: slope, depth to rock.
Carpenter	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Newbern	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Gr------------------ Grigsby	Moderate: flooding, wetness.	Severe: flooding, seepage.	Severe: seepage, wetness.	Severe: seepage.	Good.
HoB----------------- Holston	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey, small stones.
HoC2---------------- Holston	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
HsD2*:					
Holston------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Waynesboro---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Hu------------------ Huntington	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
La------------------ Lawrence	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
LdB----------------- Lonewood	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Fair: depth to rock, too clayey.
LdC2---------------- Lonewood	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: depth to rock, too clayey, slope.
LoB----------------- Lowell	Severe: percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
LoC2---------------- Lowell	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
LoD2---------------- Lowell	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Me------------------ Melvin	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
MnB----------------- Monongahela	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: small stones, wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MnC2: Monongahela	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Moderate: wetness, slope.	Fair: small stones, slope, wetness.
NeD: Nelse	Severe: flooding, poor filter, slope.	Severe: seepage, flooding, slope.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, slope.	Poor: slope.
Nk: Newark	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
NrE*:					
Newbern	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Garmon	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage, slope.	Severe: slope, seepage, depth to rock.	Poor: slope, depth to rock.
ReC2: Renox	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: small stones.
ReD2: Renox	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
RfF2*:					
Renox	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Faywood	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: slope, depth to rock.	Poor: depth to rock, too clayey, hard to pack.
RoF3: Rohan	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Se: Sensabaugh	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: small stones.
SgB: Sensabaugh	Moderate: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Poor: small stones.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
St------------------ Stokly	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
TeB----------------- Teddy	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
ToC2---------------- Trappist	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
TpD2*:					
Trappist-----------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Rohan--------------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
TrB----------------- Trimble	Slight-----------	Moderate: slope, seepage.	Moderate: too clayey.	Slight-----------	Fair: small stones, too clayey.
TrC2---------------- Trimble	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: small stones, too clayey, slope.
TrD2---------------- Trimble	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
WaC2---------------- Waynesboro	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CaD2*:				
Caneyville	Poor: depth to rock, low strength.	Improbable: excess fines, depth to rock.	Improbable: excess fines, depth to rock.	Poor: too clayey, slope, depth to rock.
Lonewood	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Cg: Chagrin	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
CrB: Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
CrC2: Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
CyF2*:				
Cynthiana	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Faywood	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Rock outcrop.				
DeB, DeC2: Dewey	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
DeD2: Dewey	Fair: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
DmD*:				
Dewey	Fair: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Lonewood	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Eg: Egam	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
EkA, EkB: Elk	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
EkC2: Elk	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
EkD2: Elk	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
FcC2*:				
Faywood	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Cynthiana	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
FcD2*:				
Faywood	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Cynthiana	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
GcF*:				
Garmon	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Carpenter	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Newbern	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Gr: Grigsby	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
HoB, HoC2: Holston	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
HsD2*:				
Holston	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Waynesboro	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Hu----------------- Huntington	Good----------------	Improbable: excess fines.	Improbable: excess fines.	Good.
La----------------- Lawrence	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
LdB---------------- Lonewood	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
LdC2--------------- Lonewood	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
LoB, LoC2---------- Lowell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
LoD2--------------- Lowell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Me----------------- Melvin	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
MnB, MnC2---------- Monongahela	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
NeD---------------- Nelse	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Nk----------------- Newark	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
NrE*:				
Newbern------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Garmon-------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
ReC2--------------- Renox	Good----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
ReD2--------------- Renox	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
RfF2*:				
Renox	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Faywood	Poor: depth to rock, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer, too clayey.
RoF3 Rohan	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Se, SgB Sensabaugh	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
St Stokly	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
TeB Teddy	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
ToC2 Trappist	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
TpD2*:				
Trappist	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
Rohan	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
TrB, TrC2 Trimble	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
TrD2 Trimble	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
WaC2 Waynesboro	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
CaD2*:					
Caneyville	Moderate: depth to rock, slope.	Severe: thin layer, hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Lonewood	Moderate: seepage, depth to rock.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
Cg Chagrin	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
CrB Crider	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
CrC2 Crider	Moderate: seepage.	Severe: piping.	Deep to water	Slope	Slope.
CyF2*:					
Cynthiana	Severe: depth to rock, slope.	Severe: thin layer, hard to pack.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope.
Faywood	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.					
DeB Dewey	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Favorable	Favorable.
DeC2, DeD2 Dewey	Moderate: seepage.	Severe: hard to pack.	Deep to water	Slope	Slope.
DmD*:					
Dewey	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope.
Lonewood	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
Eg Egam	Slight	Moderate: thin layer, hard to pack, wetness.	Deep to water	Favorable	Favorable.
EkA Elk	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
EkB-------------- Elk	Moderate: seepage, slope.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
EkC2, EkD2-------- Elk	Moderate: seepage.	Severe: piping.	Deep to water----	Slope------------	Slope.
FcC2*, FcD2*:					
Faywood----------	Moderate: depth to rock.	Severe: hard to pack.	Deep to water----	Slope, depth to rock.	Slope, depth to rock.
Cynthiana--------	Severe: depth to rock, slope.	Severe: hard to pack.	Deep to water----	Slope, large stones, depth to rock.	Large stones, slope.
GcF*:					
Garmon-----------	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water----	Slope, depth to rock.	Slope, depth to rock.
Carpenter--------	Severe: slope.	Severe: piping.	Deep to water----	Slope------------	Slope.
Newbern----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water----	Slope, depth to rock.	Slope, droughty, depth to rock.
Gr--------------- Grigsby	Severe: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
HoB-------------- Holston	Moderate: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
HoC2------------- Holston	Moderate: seepage.	Severe: piping.	Deep to water----	Slope------------	Slope.
HsD2*:					
Holston----------	Moderate: seepage.	Severe: piping.	Deep to water----	Slope------------	Slope.
Waynesboro-------	Moderate: seepate.	Severe: piping, hard to pack.	Deep to water----	Slope------------	Slope.
Hu--------------- Huntington	Moderate: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
La--------------- Lawrence	Slight-----------	Severe: piping.	Percs slowly-----	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
LdB-------------- Lonewood	Moderate: seepage, depth to rock, slope.	Moderate: thin layer, piping.	Deep to water----	Erodes easily----	Erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
LdC2-------------- Lonewood	Severe: slope.	Moderate: thin layer, piping.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
LoB--------------- Lowell	Moderate: depth to rock.	Severe: hard to pack.	Deep to water----	Favorable--------	Favorable.
LoC2, LoD2-------- Lowell	Moderate: depth to rock.	Severe: hard to pack.	Deep to water----	Slope.	Slope.
Me---------------- Melvin	Moderate: seepage.	Severe: piping, wetness.	Flooding---------	Erodes easily, wetness.	Wetness, erodes easily.
MnB--------------- Monongahela	Moderate: seepage.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
MnC2-------------- Monongahela	Moderate: seepage.	Severe: piping.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
NeD--------------- Nelse	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water----	Slope------------	Slope, droughty.
Nk---------------- Newark	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
NrE*:					
Newbern----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water----	Slope, depth to rock.	Slope, droughty, depth to rock.
Garmon-----------	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water----	Slope, depth to rock.	Slope, depth to rock.
ReC2, ReD2-------- Renox	Moderate: seepage.	Severe: piping.	Deep to water----	Slope------------	Slope.
RfF2*:					
Renox------------	Severe: slope.	Severe: piping.	Deep to water----	Slope------------	Slope.
Faywood----------	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
RoF3-------------- Rohan	Severe: depth to rock, slope.	Severe: seepage.	Deep to water----	Slope, depth to rock.	Slope, droughty.
Se, SgB----------- Sensabaugh	Severe: seepage.	Moderate: large stones.	Deep to water----	Large stones-----	Large stones.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
St----------------- Stokly	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, cutbanks cave.	Wetness----------	Wetness.
TeB--------------- Teddy	Moderate: seepage, slope.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
ToC2-------------- Trappist	Moderate: depth to rock.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock.	Slope, depth to rock.
TpD2*:					
Trappist---------	Moderate: depth to rock.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock.	Slope, depth to rock.
Rohan------------	Severe: depth to rock, slope.	Severe: seepage.	Deep to water----	Slope, depth to rock.	Slope, depth to rock.
TrB--------------- Trimble	Moderate: seepage, slope.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
TrC2, TrD2-------- Trimble	Moderate: seepage.	Severe: piping.	Deep to water----	Slope------------	Slope.
WaC2-------------- Waynesboro	Moderate: seepage.	Severe: piping, hard to pack.	Deep to water----	Slope------------	Slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
CaD2*:											
Caneyville------	0-10	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	10-19	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	19-36	Clay, silty clay	CH	A-7	0-3	90-100	60-100	60-100	60-100	50-75	30-45
	36	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Lonewood--------	0-14	Silt loam--------	ML, CL-ML, CL	A-4	0	100	90-100	85-100	75-90	18-26	3-9
	14-34	Silt loam, silty clay loam, loam.	CL	A-4, A-6	0	100	90-100	85-95	70-90	25-39	9-18
	34-59	Silty clay loam, clay loam, loam.	CL	A-6, A-7	0	95-100	85-100	75-90	65-85	29-48	10-23
	59-71	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cg--------------- Chagrin	0-10	Loam-------------	ML, CL, CL-ML	A-4	0	95-100	85-100	80-100	70-90	20-35	2-10
	10-41	Silt loam, loam, sandy loam.	ML, SM	A-4, A-2, A-6	0	90-100	75-100	55-90	30-80	20-40	NP-14
	41-75	Stratified silt loam to gravelly fine sand.	ML, SM, SP-SM	A-4, A-2	0	75-100	65-100	40-85	10-80	20-40	NP-10
CrB-------------- Crider	0-10	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	3-12
	10-33	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	3-20
	33-76	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40
CrC2------------- Crider	0-6	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	3-12
	6-33	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	3-20
	33-76	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40
CyF2*:											
Cynthiana-------	0-5	Silty clay loam	ML, CL, CL-ML	A-4, A-6, A-7	0-30	70-100	65-100	60-100	55-100	25-42	4-20
	5-18	Flaggy clay, flaggy silty clay, clay.	MH, CH, CL	A-7	5-30	70-100	65-100	60-100	55-100	45-75	20-45
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
CyF2*: Faywood	0-6	Silty clay loam	CL	A-6, A-7	0-15	100	95-100	90-100	85-100	34-42	15-22
	6-30	Silty clay, flaggy clay, silty clay loam.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CyF2*: Rock outcrop.											
DeB, DeC2 Dewey	0-10	Loam	CL-ML, CL	A-4, A-6	0	90-100	80-100	75-95	65-80	24-30	5-11
	10-51	Clay, silty clay	CH, CL, MH, ML	A-6, A-7	0-2	85-100	75-100	70-95	65-85	38-68	12-34
	51-79	Clay, silty clay, gravelly clay.	CH, CL, MH, ML	A-6, A-7	0-5	65-100	60-100	55-95	50-85	38-68	12-34
DeD2 Dewey	0-7	Loam	CL-ML, CL	A-4, A-6	0	90-100	80-100	75-95	65-80	24-30	5-11
	7-12	Clay, silty clay, silty clay loam.	CL	A-6	0	90-100	80-100	75-95	70-85	27-40	12-20
	12-50	Clay, silty clay	CH, CL, MH, ML	A-6, A-7	0-2	85-100	75-100	70-95	65-85	38-68	12-34
	50-60	Clay, silty clay, gravelly clay.	CH, CL, MH, ML	A-6, A-7	0-5	65-100	60-100	55-95	50-85	38-68	12-34
DmD*: Dewey	0-10	Loam	CL-ML, CL	A-4, A-6	0	90-100	75-100	75-95	65-85	24-30	5-11
	10-51	Clay, silty clay	CH, CL, MH, ML	A-6, A-7	0-2	85-100	75-100	70-95	65-85	38-68	12-34
	51-79	Clay, silty clay, gravelly clay.	CH, CL, MH, ML	A-6, A-7	0-5	65-100	60-100	55-100	50-85	38-68	12-34
Lonewood	0-14	Silt loam	ML, CL-ML, CL	A-4	0	100	90-100	85-100	75-90	18-26	3-9
	14-34	Silt loam, silty clay loam, loam.	CL	A-4, A-6	0	100	90-100	85-95	70-90	25-39	9-18
	34-59	Silty clay loam, clay loam, loam.	CL	A-6, A-7	0	95-100	85-100	75-90	65-85	29-48	10-23
	59-71	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Eg Egam	0-9	Silty clay loam	CL, ML, CL-ML	A-6, A-7, A-4	0	95-100	95-100	85-100	75-95	21-45	4-20
	9-50	Silty clay, silty clay loam, clay.	CL, CH	A-7, A-6	0	95-100	95-100	90-100	85-95	38-60	15-30
	50-64	Silty clay loam, clay, clay loam.	CL, ML, CH	A-4, A-6, A-7	0	95-100	95-100	90-100	70-95	25-60	8-30
EkA, EkB Elk	0-8	Silt loam	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	70-95	25-35	3-10
	8-43	Silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-40	5-15
	43-60	Silty clay loam, silt loam, silty clay.	ML, CL, CL-ML, SC-SM	A-4, A-6	0	75-100	50-100	45-100	40-95	25-40	5-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
EkC2, EkD2------- Elk	0-5	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	70-95	25-35	3-10
	5-40	Silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-40	5-15
	40-60	Silty clay loam, silt loam, silty clay.	ML, CL, CL-ML, SC-SM	A-4, A-6	0	75-100	50-100	45-100	40-95	25-40	5-15
FcC2*: Faywood---------	0-6	Silty clay loam	CL	A-6, A-7	0-15	100	95-100	90-100	85-100	34-42	15-22
	6-30	Silty clay, flaggy clay, silty clay loam.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cynthiana-------	0-5	Silty clay loam	ML, CL, CL-ML	A-4, A-6, A-7	0-30	70-100	65-100	60-100	55-100	25-42	4-20
	5-18	Flaggy clay, gravelly silty clay loam, silty clay, clay.	MH, CH, CL	A-7	5-30	70-100	65-100	60-100	55-100	45-75	20-45
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FcD2*: Faywood---------	0-6	Silty clay loam	CL	A-6, A-7	0-15	100	95-100	90-100	85-100	34-42	15-22
	6-30	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cynthiana-------	0-5	Silty clay loam	ML, CL, CL-ML	A-4, A-6, A-7	0-30	70-100	65-100	60-100	55-100	25-42	4-20
	5-18	Gravelly clay, gravelly silty clay loam, silty clay, clay.	MH, CH, CL	A-7	5-30	70-100	65-100	60-100	55-100	45-75	20-45
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GcF*: Garmon----------	0-3	Loam------------	CL, CL-ML	A-4, A-6	0	75-95	75-95	65-95	55-90	20-35	5-15
	3-24	Shaly silt loam, channery silty clay loam, channery loam.	GM-GC, CL-ML, CL, SC-SM	A-4, A-6	0-15	60-85	50-85	45-80	36-70	20-40	5-20
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
GcF*:											
Carpenter-------	0-8	Silt loam--------	ML, CL-ML	A-4	0-5	80-95	80-95	55-85	55-85	<35	NP-10
	8-13	Channery silt loam, silt loam, loam.	CL, CL-ML	A-4, A-6	0-10	60-95	60-90	55-80	55-80	20-40	5-20
	13-39	Channery silty clay loam, silty clay loam, clay loam.	CL, CL-ML, ML	A-4, A-6, A-7	0-10	60-95	60-90	55-80	55-80	25-45	5-20
	39-48	Channery silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-10	65-95	65-95	65-90	65-90	30-60	15-40
	48	Weathered bedrock	---	---	---	---	---	---	---	---	---
Newbern---------	0-2	Channery silt loam.	ML, CL-ML, CL	A-4	0-5	80-100	75-95	65-95	50-90	10-20	NP-10
	2-17	Loam, silt loam, channery loam.	ML, CL, CL-ML, GM	A-2, A-4, A-6	0-5	60-100	50-95	30-95	20-90	10-30	NP-15
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gr--------------- Grigsby	0-10	Fine sandy loam	SM, SC-SM	A-2, A-4	0-5	80-100	80-100	50-95	25-50	<20	NP-5
	10-34	Loam, fine sandy loam, silt loam.	ML, SM, SC, CL	A-2, A-4	0-5	80-100	80-100	70-100	30-70	<25	NP-10
	34-62	Fine sandy loam, loamy fine sand, loamy sand.	SM, SC-SM, ML, GM-GC	A-2, A-1, A-4	0-30	40-100	30-100	25-100	20-70	<20	NP-5
HoB-------------- Holston	0-10	Silt loam--------	ML, CL-ML, SM, SC-SM	A-4, A-2	0-5	80-100	75-100	65-100	30-75	<22	NP-6
	10-75	Loam, silt loam, clay loam, sandy clay loam.	ML, CL-ML, SM, SC-SM	A-4, A-2	0-5	80-100	75-100	50-100	30-80	21-33	3-10
HoC2------------- Holston	0-8	Silt loam--------	ML, CL-ML, SM, SC-SM	A-4, A-2	0-5	80-100	75-100	65-100	30-75	<22	NP-6
	8-60	Loam, silt loam, clay loam, sandy clay loam.	ML, CL-ML, SM, SC-SM	A-4, A-2	0-5	80-100	75-100	50-100	30-80	21-33	3-10
HsD2*:											
Holston---------	0-8	Silt loam--------	ML, CL-ML, SM, SC-SM	A-4, A-2	0-5	80-100	75-100	65-100	30-75	<22	NP-6
	8-60	Loam, silt loam, clay loam, sandy clay loam.	ML, CL-ML, SM, SC-SM	A-4, A-2	0-5	80-100	75-100	50-100	30-80	21-33	3-10
Waynesboro------	0-6	Loam-------------	ML, CL-ML, CL, SM	A-4	0-5	85-100	80-100	70-95	43-70	18-30	2-9
	6-58	Clay loam, loam, sandy clay loam.	CL, SC	A-4, A-6, A-7	0-5	90-100	85-100	75-95	45-75	30-41	9-17
	58-74	Clay loam, sandy clay, clay.	MH, CL, ML	A-4, A-6, A-7	0-5	90-100	80-100	70-98	55-75	35-68	9-32

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Hu---------------- Huntington	0-10	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
	10-75	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	60-100	60-100	60-95	25-40	5-15
La---------------- Lawrence	0-8	Silt loam--------	ML	A-4	0	100	95-100	90-100	80-100	25-35	2-10
	8-20	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-100	25-42	5-20
	20-48	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-100	25-42	5-20
	48-68	Silty clay, silty clay loam, silt loam.	ML, CL, MH, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	75-100	25-60	5-25
LdB-------------- Lonewood	0-10	Silt loam--------	ML, CL-ML, CL	A-4	0	100	90-100	85-100	75-90	18-26	3-9
	10-25	Silt loam, silty clay loam, loam.	CL	A-4, A-6	0	100	90-100	85-95	70-90	25-39	9-18
	25-60	Silty clay loam, clay loam, loam.	CL	A-6, A-7	0	95-100	85-100	75-90	65-90	29-48	10-23
LdC2------------- Lonewood	0-7	Silt loam--------	ML, CL-ML, CL	A-4	0	100	90-100	85-100	75-90	18-26	3-9
	7-34	Silt loam, silty clay loam, loam.	CL	A-4, A-6	0	100	90-100	85-95	70-90	25-39	9-18
	34-59	Silty clay loam, clay loam, loam.	CL	A-6, A-7	0	95-100	85-100	75-90	65-85	29-48	10-23
	59-71	Weathered bedrock.	---	---	---	---	---	---	---	---	---
LoB-------------- Lowell	0-10	Silt loam--------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-100	22-32	3-10
	10-26	Silty clay, clay, silty clay loam.	CL, CH, MH	A-7, A-6	0	100	95-100	90-100	85-100	35-65	15-32
	26-60	Clay, silty clay, silty clay loam.	CH, MH, CL	A-7	0-10	95-100	90-100	85-100	75-100	45-75	20-40
LoC2, LoD2------- Lowell	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-100	22-32	3-10
	8-47	Silty clay, clay, silty clay loam.	CL, CH, MH	A-7, A-6	0	100	95-100	90-100	85-100	35-65	15-32
	47-60	Clay, silty clay, silty clay loam.	CH, MH, CL	A-7	0-10	95-100	90-100	85-100	75-100	45-75	20-40
Me---------------- Melvin	0-10	Silt loam--------	CL, CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
	10-36	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-98	25-40	5-20
	36-60	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	70-100	60-98	25-40	5-20

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
MnB-------------- Monongahela	0-11	Silt loam--------	ML, SM, CL-ML, SC-SM	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	11-22	Silt loam, clay loam, gravelly loam.	ML, CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	22-53	Silt loam, sandy clay loam, gravelly loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	60-100	55-95	45-95	20-40	3-15
	53-83	Silt loam, clay loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15
MnC2------------- Monongahela	0-6	Silt loam--------	ML, SM, CL-ML, SC-SM	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	6-12	Silt loam, clay loam, gravelly loam.	ML, CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	12-32	Silt loam, sandy clay loam, gravelly loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	60-100	55-95	45-95	20-40	3-15
	32-60	Silt loam, clay loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15
NeD-------------- Nelse	0-6	Fine sandy loam	SC-SM, SM, CL-ML, ML	A-2-4, A-4	0-5	95-100	95-100	65-90	30-65	<25	NP-5
	6-56	Sandy loam, loam, loamy fine sand.	SM, SC-SM	A-2-4, A-4	0-5	95-100	90-100	60-85	25-45	<20	NP-5
	56-62	Loamy fine sand, fine sandy loam.	SM	A-2-4	0-5	95-100	90-100	60-85	15-30	<20	NP
Nk--------------- Newark	0-6	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	90-100	80-100	55-95	<32	NP-10
	6-37	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	70-100	22-42	3-20
	37-60	Silt loam, silty clay loam, loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-3	75-100	70-100	65-100	55-95	22-42	3-20
NrE*: Newbern---------	0-2	Channery silt loam.	ML, CL-ML, CL	A-4	0-5	80-100	75-95	65-95	50-90	10-20	NP-10
	2-17	Loam, silt loam, channery loam.	ML, CL, CL-ML, GM	A-2, A-4, A-6	0-5	60-100	50-95	30-95	20-90	10-30	NP-15
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Garmon----------	0-3	Loam-------------	CL, CL-ML	A-4, A-6	0	75-95	75-95	65-95	55-90	20-35	5-15
	3-24	Channery silt loam, channery silty clay loam, channery loam.	GM-GC, CL-ML, CL, SC-SM	A-4, A-6	0-15	60-85	50-85	45-80	36-70	20-40	5-20
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
ReC2, ReD2------- Renox	0-6	Gravelly loam----	ML, SM	A-4, A-2	0-3	65-95	60-90	45-80	30-70	<30	NP-8
	6-24	Gravelly loam, silt loam, gravelly sandy clay loam.	SC, ML, CL, GM	A-4, A-6, A-2	0-3	65-95	50-90	40-80	30-70	20-40	2-20
	24-67	Gravelly loam, silt loam, gravelly sandy clay loam.	GM, GC, SC, ML	A-4, A-6, A-2	0-5	55-90	45-85	35-75	30-65	20-40	2-20
RfF2*: Renox-----------	0-6	Gravelly loam----	ML, SM	A-4, A-2	0-3	65-95	60-90	45-80	30-70	<30	NP-8
	6-24	Gravelly loam, silt loam, gravelly sandy clay loam.	SC, ML, CL, GM	A-4, A-6, A-2	0-3	65-95	50-90	40-80	30-70	20-40	2-20
	24-67	Gravelly loam, silt loam, gravelly sandy clay loam.	GM, GC, SC, ML	A-4, A-6, A-2	0-5	55-90	45-85	35-75	30-65	20-40	2-20
Faywood---------	0-6	Silty clay loam	CL	A-6, A-7	0-15	100	95-100	90-100	85-100	34-42	15-22
	6-30	Silty clay, flaggy clay, silty clay loam.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
RoF3------------- Rohan	0-4	Channery silt loam.	CL, ML, GC, GM-GC	A-4, A-6	0-10	55-80	50-75	45-70	35-65	25-40	3-15
	4-18	Extremely channery silty clay loam, very channery silty clay loam.	GC, GM, GM-GC	A-2, A-6, A-7, A-1-B	0-15	25-60	25-55	20-50	15-40	25-45	3-20
	18-20	Weathered bedrock	---	---	---	---	---	---	---	---	---
	20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Se, SgB----------- Sensabaugh	0-11	Gravelly loam----	CL-ML, SC-SM, ML, SM	A-4	0-18	75-90	65-75	55-65	40-55	16-29	3-9
	11-25	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	CL-ML, CL, SC-SM, GC	A-4, A-6	2-18	70-95	55-90	45-75	35-65	20-35	5-14
	25-64	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	SC-SM, SC, GM-GC, GC	A-4, A-6	5-25	70-90	55-75	45-65	35-55	22-36	6-15
	64-79	Gravelly loam, gravelly clay loam, gravelly fine sandy loam.	SC-SM, SC, GM-GC, GC	A-4, A-6, A-2	5-30	55-90	25-75	25-65	20-55	20-36	6-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
St-------------- Stokly	0-38	Sandy loam-------	ML, SM, SC, SC-SM	A-4	0	85-100	80-100	65-90	35-65	<30	NP-10
	38-60	Gravelly sandy loam, gravelly loam, loamy sand.	SM, SC, GM, GC	A-1-B, A-2-4, A-4	0	65-100	60-100	45-70	15-45	<30	NP-10
TeB-------------- Teddy	0-5	Loam-------------	CL, CL-ML, ML	A-4	0	95-100	95-100	90-95	80-95	20-30	3-10
	5-22	Silt loam, loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-95	75-90	25-40	5-20
	22-62	Clay loam, silt loam, loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-95	75-90	25-40	5-20
ToC2------------- Trappist	0-7	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	60-95	20-35	2-14
	7-29	Silty clay, clay, channery silty clay.	CL, CH	A-7, A-6	0	80-100	60-100	55-100	50-95	35-60	12-30
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
TpD2*:											
Trappist--------	0-7	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	60-95	20-35	2-14
	7-29	Silty clay, clay, channery silty clay.	CL, CH	A-7, A-6	0	80-100	60-100	55-100	50-95	35-60	12-30
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rohan-----------	0-4	Silty clay loam	CL	A-6, A-7-6	0	95-100	95-100	85-100	70-95	30-45	10-20
	4-14	Extremely channery silty clay loam, very channery silty clay loam.	GC, GM, GM-GC	A-2, A-6, A-7, A-1-B	0-15	25-60	25-55	20-50	15-40	25-45	3-20
	14-18	Weathered bedrock	---	---	---	---	---	---	---	---	---
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
TrB-------------- Trimble	0-10	Cobbly silt loam	ML, CL, GM, SC	A-4	0-10	65-85	55-80	45-75	40-70	25-35	3-10
	10-34	Cobbly silty clay loam, cobbly silt loam.	CL, GM-GC, GC, CL-ML	A-4, A-6	0-10	65-85	55-80	45-80	40-75	25-40	5-20
	34-60	Cobbly silt loam, cobbly silty clay loam, cobbly loam.	GM, GC, ML, CL	A-4, A-6	0-10	65-85	55-80	45-75	35-75	20-40	2-20

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
TrC2, TrD2------- Trimble	0-8	Cobbly silt loam	ML, CL, GM, SC	A-4	0-10	65-85	55-80	45-75	40-70	25-35	3-10
	8-26	Cobbly silty clay loam, cobbly silt loam.	CL, GM-GC, GC, CL-ML	A-4, A-6	0-10	65-85	55-80	45-80	40-75	25-40	5-20
	26-62	Cobbly silt loam, cobbly silty clay loam, cobbly loam.	GM, GC, ML, CL	A-4, A-6	0-10	65-85	55-80	45-75	35-75	20-40	2-20
WaC2------------- Waynesboro	0-6	Loam-------------	ML, CL-ML, CL, SM	A-4	0-5	85-100	85-100	70-95	43-70	18-30	2-9
	6-58	Clay loam, loam, sandy clay loam.	CL, SC	A-4, A-6, A-7	0-5	90-100	80-100	75-95	45-75	30-41	9-17
	58-74	Clay loam, sandy clay, clay.	MH, CL, ML	A-4, A-6, A-7	0-5	90-100	80-100	70-98	55-75	35-68	9-32

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cc	In/hr	In/in	pH				Pct
CaD2*:										
Caneyville	0-10	10-27	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low	0.43	3	2-4
	10-19	36-60	1.35-1.60	0.2-0.6	0.12-0.18	4.5-7.3	Moderate	0.28		
	19-36	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate	0.28		
	36	---	---	0.06-2.0	---	---	---	---		
Lonewood	0-14	15-25	1.30-1.40	0.6-2.0	0.18-0.20	4.5-5.5	Low	0.37	4	1-3
	14-34	20-39	1.30-1.45	0.6-2.0	0.16-0.18	4.5-5.5	Low	0.37		
	34-59	25-45	1.40-1.55	0.6-2.0	0.14-0.17	4.5-5.5	Low	0.32		
	59-71	---	---	0.00-0.2	---	---	---	---		
Cg Chagrin	0-10	10-27	1.20-1.40	0.6-2.0	0.20-0.24	5.6-7.3	Low	0.32	5	2-4
	10-41	18-30	1.20-1.50	0.6-2.0	0.14-0.20	5.6-7.3	Low	0.32		
	41-75	5-25	1.20-1.40	0.6-2.0	0.08-0.20	5.6-7.3	Low	0.32		
CrB Crider	0-10	15-27	1.20-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low	0.32	5	2-4
	10-33	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-7.3	Low	0.28		
	33-65	30-60	1.20-1.55	0.6-2.0	0.12-0.18	4.5-6.5	Moderate	0.28		
CrC2 Crider	0-6	15-27	1.20-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low	0.32	5	2-4
	6-45	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-7.3	Low	0.28		
	45-65	30-60	1.20-1.55	0.6-2.0	0.12-0.18	4.5-6.5	Moderate	0.28		
CyF2*:										
Cynthiana	0-5	15-40	1.20-1.40	0.6-2.0	0.15-0.20	6.1-7.8	Moderate	0.37	2	1-4
	5-18	40-60	1.35-1.60	0.2-0.6	0.08-0.15	6.1-7.8	Moderate	0.28		
	18	---	---	0.0-0.06	---	---	---	---		
Faywood	0-6	27-40	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low	0.37	3	1-4
	6-30	35-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.8	Moderate	0.28		
	30	---	---	0.0-0.06	---	---	---	---		
Rock outcrop.										
DeB, DeC2 Dewey	0-10	17-27	1.35-1.50	0.6-2.0	0.18-0.20	4.5-5.5	Low	0.32	5	1-3
	10-51	45-60	1.45-1.55	0.6-2.0	0.12-0.17	4.5-5.5	Moderate	0.24		
	51-79	45-60	1.45-1.55	0.6-2.0	0.08-0.17	4.5-5.5	Moderate	0.24		
DeD2 Dewey	0-7	17-27	1.35-1.50	0.6-2.0	0.18-0.20	4.5-5.5	Low	0.32	5	1-3
	7-12	35-50	1.45-1.55	0.6-2.0	0.12-0.18	4.5-5.5	Moderate	0.24		
	12-50	45-60	1.45-1.55	0.6-2.0	0.12-0.17	4.5-5.5	Moderate	0.24		
	50-60	45-60	1.45-1.55	0.6-2.0	0.08-0.17	4.5-5.5	Moderate	0.24		
DmD*:										
Dewey	0-10	17-27	1.35-1.50	0.6-2.0	0.18-0.20	4.5-5.5	Low	0.32	5	1-3
	10-51	45-60	1.45-1.55	0.6-2.0	0.12-0.17	4.5-5.5	Moderate	0.24		
	51-79	45-60	1.45-1.55	0.6-2.0	0.08-0.17	4.5-5.5	Moderate	0.24		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
DmD*:										
Lonewood--------	0-14	15-25	1.30-1.40	0.6-2.0	0.18-0.20	4.5-5.5	Low----------	0.37	4	1-3
	14-34	20-39	1.30-1.45	0.6-2.0	0.16-0.18	4.5-5.5	Low----------	0.37		
	34-59	25-45	1.40-1.55	0.6-2.0	0.14-0.17	4.5-5.5	Low----------	0.32		
	59-71	---	---	---	---	---	---	---		
Eg--------------- Egam	0-9	20-35	1.30-1.45	0.2-0.6	0.18-0.22	5.6-7.3	Moderate-----	0.32	5	2-4
	9-50	35-50	1.30-1.45	0.2-0.6	0.14-0.20	5.6-7.3	Moderate-----	0.32		
	50-64	30-45	1.30-1.45	0.2-0.6	0.12-0.18	5.6-8.4	Moderate-----	0.37		
EkA, EkB--------- Elk	0-8	10-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low----------	0.37	5	.5-3
	8-43	18-34	1.20-1.50	0.6-2.0	0.18-0.22	4.5-6.5	Low----------	0.28		
	43-60	15-40	1.20-1.50	0.6-2.0	0.14-0.20	4.5-6.5	Low----------	0.28		
EkC2, EkD2------- Elk	0-5	10-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low----------	0.37	5	.5-3
	5-40	18-34	1.20-1.50	0.6-2.0	0.18-0.22	4.5-6.5	Low----------	0.28		
	40-60	15-40	1.20-1.50	0.6-2.0	0.14-0.20	4.5-6.5	Low----------	0.28		
FcC2*:										
Faywood---------	0-6	27-40	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37	3	1-4
	6-30	35-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
	30	---	---	0.0-0.06	---	---	-------------	----		
Cynthiana-------	0-5	15-40	1.20-1.40	0.6-2.0	0.15-0.20	6.1-7.8	Moderate-----	0.37	2	1-4
	5-18	40-60	1.35-1.60	0.2-0.6	0.08-0.15	6.1-7.8	Moderate-----	0.28		
	18	---	---	0.0-0.06	---	---	-------------	----		
FcD2*:										
Faywood---------	0-6	27-40	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37	3	1-4
	6-30	35-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
	30	---	---	0.0-0.06	---	---	-------------	----		
Cynthiana-------	0-5	15-40	1.20-1.40	0.6-2.0	0.15-0.20	6.1-7.8	Moderate-----	0.37	2	1-4
	5-18	40-60	1.35-1.60	0.2-0.6	0.08-0.15	6.1-7.8	Moderate-----	0.28		
	18	---	---	0.0-0.06	---	---	-------------	----		
GcF*:										
Garmon----------	0-3	7-27	1.20-1.40	2.0-6.0	0.14-0.20	4.5-7.3	Low----------	0.32	3	<3
	3-24	18-34	1.20-1.50	2.0-6.0	0.05-0.16	5.6-7.3	Low----------	0.20		
	24	---	---	0.2-2.0	---	---	-------------	----		
Carpenter-------	0-8	10-27	1.20-1.40	2.0-6.0	0.16-0.22	4.5-6.5	Low----------	0.32	4	1-4
	8-13	18-30	1.20-1.50	0.6-2.0	0.10-0.20	4.5-6.5	Low----------	0.28		
	13-39	18-35	1.20-1.50	0.6-2.0	0.10-0.20	4.5-6.5	Low----------	0.28		
	39-48	30-55	1.20-1.60	0.06-0.6	0.07-0.16	4.5-6.0	Moderate-----	0.28		
	48	---	---	0.0-0.2	---	---	-------------	----		
Newbern---------	0-2	10-27	1.20-1.50	0.6-2.0	0.07-0.20	5.6-7.3	Low----------	0.28	2	1-2
	2-17	10-27	1.30-1.60	0.6-2.0	0.07-0.20	5.6-7.3	Low----------	0.28		
	17	---	---	2.0-20	---	---	-------------	----		
Gr--------------- Grigsby	0-10	5-10	1.20-1.50	2.0-6.0	0.08-0.14	5.6-7.3	Low----------	0.28	5	1-4
	10-34	5-18	1.20-1.50	0.6-6.0	0.10-0.20	5.6-7.3	Low----------	0.28		
	34-62	5-10	1.20-1.50	2.0-6.0	0.03-0.16	5.1-7.3	Low----------	0.28		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
HoB--------------	0-10	10-25	1.35-1.50	0.6-2.0	0.15-0.20	4.5-5.5	Low-----------	0.28	5	.5-2
Holston	10-75	18-35	1.40-1.55	0.6-2.0	0.13-0.20	4.5-5.5	Low-----------	0.32		
HoC2-------------	0-8	10-25	1.35-1.50	0.6-2.0	0.15-0.20	4.5-5.5	Low-----------	0.28	5	.5-2
Holston	8-60	18-35	1.40-1.55	0.6-2.0	0.13-0.20	4.5-5.5	Low-----------	0.32		
HsD2*:										
Holston---------	0-8	10-25	1.35-1.50	0.6-2.0	0.15-0.20	4.5-5.5	Low-----------	0.28	5	.5-2
	8-60	18-35	1.40-1.55	0.6-2.0	0.13-0.20	4.5-5.5	Low-----------	0.32		
HsD2*:										
Waynesboro------	0-6	10-30	1.40-1.55	0.6-2.0	0.15-0.21	4.5-5.5	Low-----------	0.28	5	.5-2
	6-58	23-35	1.40-1.55	0.6-2.0	0.14-0.20	4.5-5.5	Low-----------	0.28		
	58-74	35-50	1.40-1.55	0.6-2.0	0.13-0.18	4.5-5.5	Low-----------	0.28		
Hu---------------	0-10	18-30	1.10-1.30	0.6-2.0	0.18-0.24	5.6-7.8	Low-----------	0.28	5	3-6
Huntington	10-75	18-30	1.30-1.50	0.6-2.0	0.16-0.22	5.6-7.8	Low-----------	0.32		
La---------------	0-8	12-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low-----------	0.43	3	1-4
Lawrence	8-20	18-35	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.5	Low-----------	0.37		
	20-48	18-35	1.50-1.70	0.06-0.2	0.08-0.12	4.5-5.5	Low-----------	0.43		
	48-68	18-60	1.50-1.70	0.06-0.6	0.08-0.12	4.5-7.3	Low-----------	0.37		
LdB--------------	0-10	15-25	1.30-1.40	0.6-2.0	0.18-0.20	4.5-5.5	Low-----------	0.37	4	1-3
Lonewood	10-25	20-39	1.30-1.45	0.6-2.0	0.16-0.18	4.5-5.5	Low-----------	0.37		
	25-60	25-45	1.40-1.55	0.6-2.0	0.14-0.17	4.5-5.5	Low-----------	0.32		
LdC2-------------	0-7	15-25	1.30-1.40	0.6-2.0	0.18-0.20	4.5-5.5	Low-----------	0.37	4	1-3
Lonewood	7-34	20-39	1.30-1.45	0.6-2.0	0.16-0.18	4.5-5.5	Low-----------	0.37		
	34-59	25-45	1.40-1.55	0.6-2.0	0.14-0.17	4.5-5.5	Low-----------	0.32		
	59-71	---	---	---	---	---	---	---		
LoB--------------	0-10	12-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-6.5	Low-----------	0.37	3	1-4
Lowell	10-26	35-60	1.30-1.60	0.2-2.0	0.13-0.19	4.5-6.5	Moderate-----	0.28		
	26-60	40-60	1.50-1.60	0.2-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
LoC2, LoD2-------	0-8	12-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-6.5	Low-----------	0.37	3	1-4
Lowell	8-47	35-60	1.30-1.60	0.2-2.0	0.13-0.19	4.5-6.5	Moderate-----	0.28		
	47-60	40-60	1.50-1.60	0.2-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
Me---------------	0-10	12-17	1.20-1.60	0.6-2.0	0.18-0.23	5.6-7.8	Low-----------	0.43	5	.5-3
Melvin	10-36	12-35	1.30-1.60	0.6-2.0	0.18-0.23	5.6-7.8	Low-----------	0.43		
	36-60	7-40	1.40-1.70	0.6-2.0	0.16-0.23	5.6-7.8	Low-----------	0.43		
MnB--------------	0-11	10-27	1.20-1.40	0.6-2.0	0.18-0.24	4.5-5.5	Low-----------	0.43	3	2-4
Monongahela	11-22	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	Low-----------	0.43		
	22-53	18-35	1.30-1.60	0.06-0.6	0.08-0.12	4.5-5.5	Low-----------	0.43		
	53-83	10-35	1.20-1.40	0.2-0.6	0.08-0.12	4.5-5.5	Low-----------	0.37		
MnC2-------------	0-6	10-27	1.20-1.40	0.6-2.0	0.18-0.24	4.5-5.5	Low-----------	0.43	3	2-4
Monongahela	6-12	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	Low-----------	0.43		
	12-32	18-35	1.30-1.60	0.06-0.6	0.08-0.12	4.5-5.5	Low-----------	0.43		
	32-60	10-35	1.20-1.40	0.2-0.6	0.08-0.12	4.5-5.5	Low-----------	0.37		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
NeD-------------- Nelse	0-6	5-25	1.20-1.60	2.0-6.0	0.09-0.14	5.1-8.4	Low----------	0.17	5	2-10
	6-56	2-18	1.40-1.80	2.0-20	0.09-0.14	5.1-8.4	Low----------	0.15		
	56-62	2-12	1.40-1.80	2.0-20	0.05-0.10	5.1-8.4	Low----------	0.15		
Nk--------------- Newark	0-6	7-27	1.20-1.40	0.6-2.0	0.15-0.23	5.6-7.8	Low----------	0.43	5	1-4
	6-37	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43		
	37-60	12-40	1.30-1.50	0.6-2.0	0.15-0.22	5.6-7.8	Low----------	0.43		
NrE*:										
Newbern---------	0-2	10-27	1.20-1.50	0.6-2.0	0.07-0.20	5.6-7.3	Low----------	0.28	2	1-2
	2-17	10-27	1.30-1.60	0.6-2.0	0.07-0.20	5.6-7.3	Low----------	0.28		
	17	---	---	2.0-20	---	---	-------------	----		
Garmon----------	0-3	7-27	1.20-1.40	2.0-6.0	0.14-0.20	4.5-7.3	Low----------	0.32	3	<3
	3-24	18-34	1.20-1.50	2.0-6.0	0.05-0.16	5.6-7.3	Low----------	0.20		
	24	---	---	0.2-2.0	---	---	-------------	----		
ReC2, ReD2------- Renox	0-6	10-27	1.20-1.40	0.6-6.0	0.10-0.16	5.1-7.8	Low----------	0.20	4	1-4
	6-24	18-35	1.20-1.45	0.6-2.0	0.10-0.16	5.1-7.8	Low----------	0.17		
	24-67	15-35	1.25-1.45	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.17		
RfF2*:										
Renox-----------	0-6	10-27	1.20-1.40	0.6-6.0	0.10-0.16	5.1-7.8	Low----------	0.20	4	1-4
	6-24	18-35	1.20-1.45	0.6-2.0	0.10-0.16	5.1-7.8	Low----------	0.17		
	24-67	15-35	1.25-1.45	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.17		
Faywood---------	0-6	27-40	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37	3	1-4
	6-30	35-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
	30	---	---	0.0-0.06	---	---	-------------	----		
RoF3------------ Rohan	0-4	15-34	1.20-1.50	0.6-2.0	0.10-0.16	4.5-6.0	Low----------	0.28	2	.5-3
	4-18	15-34	1.20-1.60	0.2-2.0	0.04-0.10	3.6-6.0	Low----------	0.17		
	18-20	---	---	0.0-0.2	---	---	-------------	----		
	20	---	---	0.0-0.2	---	---	-------------	----		
Se, SgB----------- Sensabaugh	0-11	8-25	1.25-1.40	0.6-6.0	0.10-0.16	5.6-7.8	Low----------	0.20	5	1-3
	11-25	18-35	1.30-1.50	0.6-6.0	0.10-0.16	5.6-7.8	Low----------	0.20		
	25-64	12-35	1.30-1.50	0.6-6.0	0.10-0.15	5.6-7.8	Low----------	0.17		
	64-79	12-38	1.25-1.50	0.6-6.0	0.08-0.14	5.6-7.8	Low----------	0.17		
St--------------- Stokly	0-38	5-18	1.30-1.65	2.0-6.0	0.10-0.18	3.6-7.3	Low----------	0.28	3	1-4
	38-60	7-18	1.35-1.65	2.0-6.0	0.08-0.18	3.6-5.5	Low----------	0.17		
TeB-------------- Teddy	0-5	12-25	1.35-1.60	0.6-2.0	0.20-0.22	4.5-6.5	Low----------	0.43	3	0-2
	5-22	18-35	1.40-1.60	0.6-2.0	0.18-0.20	4.5-6.5	Low----------	0.43		
	22-62	18-35	1.55-1.80	0.06-0.2	0.08-0.12	4.5-5.5	Low----------	0.43		
ToC2------------- Trappist	0-7	7-27	1.20-1.40	0.6-2.0	0.15-0.23	3.6-5.5	Low----------	0.37	3	1-3
	7-29	30-60	1.40-1.65	0.2-0.6	0.08-0.18	3.6-5.5	Moderate-----	0.28		
	29	---	---	0.00-0.2	---	---	-------------	----		
TpD2*:										
Trappist--------	0-7	7-27	1.20-1.40	0.6-2.0	0.15-0.23	3.6-5.5	Low----------	0.37	3	1-3
	7-29	30-60	1.40-1.65	0.2-0.6	0.08-0.18	3.6-5.5	Moderate-----	0.28		
	29	---	---	0.00-0.2	---	---	-------------	----		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
TpD2*:										
Rohan	0-4	28-34	1.20-1.50	0.6-2.0	0.18-0.22	4.5-6.0	Low	0.28	2	.5-3
	4-14	15-34	1.20-1.60	0.2-2.0	0.04-0.10	3.6-6.0	Low	0.17		
	14-18	---	---	0.0-0.2	---	---	-------------	----		
	18	---	---	0.0-0.2	---	---	-------------	----		
TrB Trimble	0-10	15-25	1.25-1.45	0.6-2.0	0.14-0.19	3.6-5.5	Low	0.28	3	.5-2
	10-34	18-34	1.30-1.55	0.6-2.0	0.14-0.19	3.6-5.5	Low	0.28		
	34-60	18-34	1.45-1.55	0.6-2.0	0.14-0.19	3.6-5.5	Low	0.24		
TrC2, TrD2 Trimble	0-8	15-25	1.25-1.45	0.6-2.0	0.14-0.19	3.6-5.5	Low	0.28	3	.5-2
	8-26	18-34	1.30-1.55	0.6-2.0	0.14-0.19	3.6-5.5	Low	0.28		
	26-62	18-34	1.45-1.55	0.6-2.0	0.14-0.19	3.6-5.5	Low	0.24		
WaC2 Waynesboro	0-6	10-30	1.40-1.55	0.6-2.0	0.15-0.21	4.5-5.5	Low	0.28	5	.5-2
	6-58	23-35	1.40-1.55	0.6-2.0	0.14-0.20	4.5-5.5	Low	0.28		
	58-74	35-50	1.40-1.55	0.6-2.0	0.13-0.18	4.5-5.5	Low	0.28		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
CaD2*:											
Caneyville------	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
Lonewood--------	B	None--------	---	---	>6.0	---	---	40-72	Hard	Low------	Moderate.
Cg--------------- Chagrin	B	Occasional	Brief----	Nov-May	4.0-6.0	Apparent	Feb-Mar	>60	---	Low------	Moderate.
CrB, CrC2-------- Crider	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
CyF2*:											
Cynthiana-------	D	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low.
Faywood---------	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
Rock outcrop.											
DeB, DeC2, DeD2-- Dewey	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
DmD*:											
Dewey-----------	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
Lonewood--------	B	None--------	---	---	>6.0	---	---	40-72	Hard	Low------	Moderate.
Eg--------------- Egam	C	Rare--------	---	---	3.0-4.0	Apparent	Dec-Mar	>60	---	High-----	Low.
EkA, EkB, EkC2, EkD2------------ Elk	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
FcC2*, FcD2*:											
Faywood---------	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
Cynthiana-------	D	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low.
GcF*:											
Garmon----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Moderate.
Carpenter-------	B	None--------	---	---	>6.0	---	---	>40	Soft	Low------	Moderate.
Newbern---------	C	None--------	---	---	>6.0	---	---	10-20	Hard	Low------	Low.
Gr--------------- Grigsby	B	None--------	---	---	3.5-6.0	Apparent	Jan-Apr	>60	---	Low------	Low.
HoB, HoC2-------- Holston	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
HsD2*:											
Holston----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High.
Waynesboro------	B	None--------	---	---	>6.0	---	---	>60	---	High-----	High.
Hu--------------- Huntington	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
La--------------- Lawrence	C	None--------	---	---	1.0-2.0	Perched	Dec-Apr	>60	---	High-----	High.
LdB, LdC2-------- Lonewood	B	None--------	---	---	>6.0	---	---	40-72	Hard	Low------	Moderate.
LoB, LoC2, LoD2-- Lowell	C	None--------	---	---	>6.0	---	---	>40	Hard	High-----	Moderate.
Me--------------- Melvin	D	Occasional	Brief to long.	Dec-May	0-1.0	Apparent	Dec-May	>60	---	High-----	Low.
MnB, MnC2-------- Monongahela	C	None--------	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	High-----	High.
NeD-------------- Nelse	B	Frequent----	Brief----	Jan-Dec	4.0-6.0	Apparent	Feb-Mar	>60	---	Low------	Moderate.
Nk--------------- Newark	C	Occasional	Brief----	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High-----	Low.
NrE*:											
Newbern----------	C	None--------	---	---	>6.0	---	---	10-20	Hard	Low------	Low.
Garmon-----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Moderate.
ReC2, ReD2------- Renox	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Low.
RfF2*:											
Renox------------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Low.
Faywood----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
RoF3------------- Rohan	D	None--------	---	---	>6.0	---	---	10-20	Hard	High-----	High.
Se--------------- Sensabaugh	B	Occasional	Very brief.	Jan-Apr	4.0-6.0	Apparent	Jan-Apr	>60	---	Low------	Low.
SgB-------------- Sensabaugh	B	None--------	---	---	4.0-6.0	Apparent	Jan-Apr	>60	---	Low------	Low.
St--------------- Stokly	B	Occasional	Very brief.	Dec-May	0.5-1.0	Apparent	Dec-May	>60	---	Moderate	High.
TeB-------------- Teddy	C	None--------	---	---	2.0-3.0	Perched	Jan-Apr	>60	---	Moderate	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
ToC2------------- Trappist	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	High.
TpD2*:											
Trappist--------	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	High.
Rohan-----------	D	None--------	---	---	>6.0	---	---	10-20	Hard	High-----	High.
TrB, TrC2, TrD2-- Trimble	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High.
WaC2------------- Waynesboro	B	None--------	---	---	>6.0	---	---	>60	---	High-----	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--PHYSICAL ANALYSES OF SELECTED SOILS

(A dash indicates the material was not detected. A blank indicates that the determination was not made. The soils are the typical pedons for the soil series in the survey area. For the location of the pedons, see "Soil Series and Their Morphology". Soil samples were analyzed by the Kentucky Agricultural Experiment Station, Lexington, Kentucky)

Soil name, report number, horizon, and depth in inches	Total			Size class and particle diameter (mm)								Coarse fragments		
				Sand						Very fine sand plus silt (0.1-0.002)				
	Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Sand coarser than very fine (2-0.1)		Textural class	>2 mm	2-19 mm	19-76 mm
	----------Pct <2mm----------											Pct	Pct	Pct
Chagrin loam (S89-KY-057-6)														
Ap---------0 to 10	32.1	49.1	18.8	2.5	1.7	8.2	12.9	6.8	25.3	55.9	l	---	---	---
AB--------10 to 25	26.5	48.0	25.5	0.9	1.0	7.2	11.7	5.7	20.8	53.7	l	---	---	---
Bw1-------25 to 31	40.6	36.6	22.8	5.9	4.7	14.8	12.5	2.7	37.9	39.3	l	---	---	---
Bw2-------31 to 41	55.0	24.0	21.0	6.4	7.4	24.0	14.4	2.8	52.2	26.8	scl	7	7	---
C---------41 to 75	65.7	16.9	17.4	31.3	12.3	14.0	6.2	1.9	51.7	18.8	cosl	15	12	3
Dewey loam (S89KY-057-10)														
Ap---------0 to 10	37.3	47.9	14.8	5.8	6.6	18.3	4.7	1.9	35.4	49.8	l	---	---	---
Bt1-------10 to 20	24.2	25.5	50.3	1.0	2.5	14.2	5.8	0.7	18.4	26.2	c	---	---	---
Bt2-------20 to 33	29.6	19.6	50.8	0.9	3.8	17.4	2.6	4.9	27.0	24.5	c	---	---	---
Bt3-------33 to 51	32.3	20.5	47.2	1.2	4.9	18.9	2.6	4.7	27.6	25.2	c	---	---	---
Bt4-------51 to 68	30.6	20.2	49.2	1.4	4.7	17.7	5.5	1.3	29.3	21.5	c	---	---	---
Bt5-------68 to 79	31.6	25.7	42.7	2.2	4.1	16.8	7.4	1.1	30.5	26.8	c	---	---	---
Holston silt loam (S89KY-057-4)														
Ap-------- 0 to 10	29.4	52.6	18.0	3.5	4.3	13.1	7.6	0.9	28.5	53.5	sil	---	---	---
Bt1-------10 to 26	29.3	50.3	20.4	3.5	3.7	13.0	8.3	0.8	28.5	51.1	sil	---	---	---
Bt2-------26 to 39	29.0	37.0	34.0	2.2	3.1	13.6	8.7	1.4	27.6	38.4	cl	---	---	---
Bt3-------39 to 54	27.7	33.0	39.3	1.8	3.0	13.3	8.6	1.0	26.7	34.0	cl	---	---	---
Bt4-------54 to 75	31.5	29.1	39.4	1.7	3.7	14.7	9.1	2.3	29.2	31.4	cl	---	---	---
Huntington silt loam* (S89KY-057-1)														
Ap---------0 to 10	29.3	53.2	17.5	0.3	1.0	1.1	11.2	15.7	13.6	68.9	sil	---	---	---
A---------10 to 23	22.7	50.6	26.7	0.2	0.2	0.4	7.3	14.6	8.1	65.2	sil	---	---	---
Bw1-------23 to 35	29.8	44.1	26.1	0.2	0.3	0.2	8.8	20.3	9.5	64.4	l	---	---	---
Bw2-------35 to 50	15.8	49.4	34.8	0.1	0.1	0.1	4.4	11.1	4.7	60.5	sicl	---	---	---
Bw3-------50 to 75	15.6	54.4	30.0	0.2	0.2	0.1	3.4	11.7	3.9	66.1	sicl	---	---	---

See footnotes at end of table.

TABLE 17.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil name, report number, horizon, and depth in inches	Total			Size class and particle diameter (mm)							Textural class	Coarse fragments		
				Sand										
	Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Sand coarser than very fine (2-0.1)	Very fine sand plus silt (0.1-0.002)		>2 mm	2-19 mm	19-76 mm
	Pct <2mm											Pct	Pct	Pct
Renox gravelly loam** (S89KY-057-5)														
Ap---------0 to 6	43.6	36.6	19.8	11.3	5.8	11.3	11.0	4.2	39.4	40.8	l	24	23	1
BA---------6 to 13	38.1	39.5	22.4	8.6	5.5	10.1	10.4	3.5	34.6	43.0	l	22	21	1
Bt1--------13 to 24	40.1	36.6	23.3	9.3	5.7	11.1	10.5	3.5	36.6	40.1	l	37	35	2
Bt2--------24 to 36	30.8	42.1	27.1	6.6	3.9	8.3	8.7	3.3	27.5	45.4	cl	20	16	4
Bt3--------36 to 53	29.5	44.9	25.6	4.5	3.2	7.4	10.4	4.0	25.5	48.9	l	12	11	1
BC---------53 to 67	39.3	39.9	20.8	2.7	3.1	10.4	17.1	6.0	33.3	45.9	l	15	10	5

* The Bw1 horizon of Huntington silt loam has texture of loam but the pedon classifies in the fine-silty family.
** S89KY-057-5 is the type location for the Renox series.

TABLE 18.--CHEMICAL ANALYSES OF SELECTED SOILS

(Absence of an entry indicates that the determination was not made. The pedons are typical of the soil series in the survey area. For the location of the pedons, see the section "Soil Series and Their Morphology". Soil samples were analyzed by the Kentucky Agricultural Experiment Station, Lexington, Kentucky)

Soil name, report number, horizon, and depth in inches	pH		Extractable cations					Cation-exchange capacity		Extractable acidity	Hydrogen plus aluminum	Base saturation		Organic matter	Calcium carbonate equivalent	Phosphorus	Potassium
	H_2O 1:1	SMP Buf. 1:1	Ca	Mg	K	Na	Total (TEC)	Ammonium acetate	Sum of cations			Ammonium acetate	Sum of cations				
			----------Milliequivalents per 100 grams of soil----------									Pct	Pct	Pct	Pct	p/m	p/m
Chagrin loam (S89KY-057-6)																	
Ap----0 to 10	5.4	6.4	2.66	0.29	0.44	0.68	4.07	7.86	12.66	8.59	---	52	32	2.69	0.32	1030	381
AB---10 to 25	6.1	6.9	7.74	0.70	0.32	0.30	6.06	7.50	10.43	4.37	---	81	58	1.91	0.20	35	314
Bw1--25 to 31	5.9	7.0	4.21	0.68	0.32	0.14	5.35	6.88	9.15	3.80	---	78	58	0.93	0.52	39	220
Bw2--31 to 41	5.5	6.9	4.08	0.69	0.27	0.31	5.17	6.07	8.62	3.45	---	85	60	0.68	0.16	58	177
C----41 to 75	5.6	6.9	3.54	0.62	0.24	0.08	4.48	6.25	9.67	5.19	---	72	46	1.03	1.04	47	184
Dewey loam (S89KY-057-10)																	
Ap----0 to 10	5.4	6.6	1.64	0.21	0.33	0.13	2.31	9.91	10.25	7.94	---	23	23	2.52	0.63	136	272
Bt1--10 to 20	4.7	5.5	1.77	0.65	0.40	0.05	2.87	7.85	16.49	13.62	---	37	17	1.22	0.11	4	316
Bt2--20 to 33	4.4	5.6	0.95	0.49	0.23	0.38	2.05	7.77	14.30	12.25	---	26	14	0.44	0.14	2	163
Bt3--33 to 51	4.5	5.7	0.43	0.49	0.14	0.16	1.22	7.68	13.45	12.23	---	16	9	0.36	0.32	2	110
Bt4--51 to 68	4.6	5.6	0.24	0.31	0.09	0.07	0.71	7.59	11.90	11.19	---	9	6	0.30	0.14	2	70
Bt5--68 to 79	4.8	5.4	0.34	0.33	0.12	0.12	0.91	7.42	13.39	12.48	---	12	7	0.24	0.61	2	65
Holston silt loam (S89KY-057-4)																	
Ap----0 to 10	5.7	6.5	4.40	0.43	0.66	0.47	5.96	8.75	15.61	9.65	---	68	38	2.08	0.22	570	481
Bt1--10 to 26	5.2	6.7	2.50	0.26	0.43	0.49	3.68	6.61	11.53	7.85	---	56	32	0.49	0.99	33	361
Bt2--26 to 39	4.8	6.2	1.92	0.34	0.35	0.44	3.05	7.86	10.41	7.36	---	39	29	0.30	0.16	15	280
Bt3--39 to 54	4.5	5.9	1.88	0.46	0.27	0.49	3.10	9.20	14.46	11.36	---	33	21	0.32	0.18	26	208
Bt4--54 to 54	4.6	5.8	1.02	0.46	0.20	0.46	2.14	9.11	14.36	12.22	---	23	15	0.44	0.32	37	170
Huntington silt loam (S89KY-057-1)																	
Ap----0 to 9	6.2	7.0	5.56	0.98	0.24	0.11	6.89	9.38	8.25	1.36	---	73	83	3.36	0.19	51	196
A-----9 to 23	6.6	6.7	7.48	1.30	0.13	0.12	9.03	10.82	10.17	1.14	---	83	89	3.16	0.54	2	99
Bw1--23 to 35	6.2	6.8	6.06	0.93	0.1	0.09	7.18	8.93	9.30	2.12	---	80	77	1.75	0.18	2	83
Bw2--35 to 50	5.8	6.4	5.18	1.12	0.22	0.06	6.58	7.50	12.57	5.99	---	88	52	2.03	0.23	1	90
Bw3--50 to 75	5.5	6.1	4.09	1.30	0.11	0.09	5.59	5.90	10.79	5.20	---	95	52	1.58	0.18	1	96

TABLE 18.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name, report number, horizon, and depth in inches	pH		Extractable cations					Cation-exchange capacity				Base saturation					
	H_2O 1:1	SMP Buf. 1:1	Ca	Mg	K	Na	Total (TEC)	Ammonium acetate	Sum of cat-ions	Extract-able acidity	Hydrogen plus aluminum	Ammonium acetate	Sum of cat-ions	Organic matter	Calcium carbonate equivalent	Phos-phorus	Potas-sium
			Milliequivalents per 100 grams of soil									Pct	Pct	Pct	Pct	p/m	p/m
Renox gravelly loam (S89KY-057-5)																	
Ap----0 to 6	5.3	6.4	4.05	0.39	0.54	0.10	5.08	8.39	12.36	1.28	---	61	41	2.25	0.13	250	470
BA----6 to 13	5.7	6.8	5.35	0.57	0.38	0.13	6.43	9.28	10.71	4.28	---	69	60	1.97	0.46	35	258
Bt1--13 to 24	6.5	7.0	5.79	0.57	0.13	0.14	6.63	8.21	9.11	2.48	---	81	73	1.73	0.13	11	123
Bt2--24 to 36	6.5	7.1	6.66	0.64	0.23	0.28	7.81	9.64	20.60	12.79	---	81	38	1.35	0.18	9	178
Bt3--36 to 53	6.3	7.1	5.94	0.82	0.19	0.68	7.63	9.28	16.54	8.91	---	82	46	0.98	0.16	20	178
BC---53 to 67	6.0	7.2	4.36	0.87	0.11	0.37	5.71	7.50	13.73	8.02	---	76	42	0.46	0.19	19	131

TABLE 19.--ENGINEERING INDEX TEST DATA

(A dash indicates data was not available. NP means nonplastic. Unless noted, the soils are the typical pedons for the soil series in the survey area. For the location of the pedons, see "Soil Series and Their Morphology" or refer to the footnote. Some horizons were combined for sampling purposes. Some horizons were not sampled. Soil samples were tested by the Soil Mechanics Laboratory, Fort Worth, Texas)

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution										Liquid limit	Plasticity index
			Percentage passing sieve--							Percentage smaller than--				
	AASHTO	Unified	2 inches	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm	Pct	
Monongahela silt loam: (S89KY-057-3)*														
Ap,Bt1------------0 to 22	A-6	CL	---	---	---	---	100	97	83	60	36	23	27	12
Btx1,2Btx2-------22 to 53	A-6	CL	---	---	---	---	100	96	73	56	38	29	32	14
Dewey loam: (S89KY-057-10)*														
Ap----------------0 to 10	A-4	CL-ML					100	98	67	50	26	17	20	6
Bt1,Bt2,Bt3------10 to 51	A-7-5	MH					100	99	72	68	58	57	55	24
Bt4,Bt5----------51 to 79	A-7-5	MH					100	94	76	71	61	54	55	20
Holston silt loam: (S89KY-057-2)														
Ap,Bt1,Bt2--------0 to 30	A-6	CL					100	99	81	64	36	25	29	13
Btx,2Bt1,2Bt2----30 to 73	A-6	CL					100	99	80	62	43	36	35	13
Lonewood silt loam: (S89KY-057-9)*														
Ap,BA,Bt1,Bt2-----0 to 26	A-4	CL					100	98	79	56	29	17	23	9
2Bt3,2BC---------26 to 46	A-7-6	CL					100	99	73	59	49	40	43	18
Renox gravelly loam: (S89KY-057-5)*														
Ap,BA-------------0 to 13	A-6	CL	100	100	100	100	100	89	67	44	31	21	29	11
Bt1,Bt2----------13 to 36	A-6	CL	100	99	96	91	81	76	60	45	33	22	30	14
Bt3--------------36 to 53	A-4	CL	100	100	100	100	100	92	74	54	37	27	30	14

* Type location.

TABLE 20.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Caneyville	Fine, mixed, mesic Typic Hapludalfs
*Carpenter	Fine-loamy, mixed, mesic Ultic Hapludalfs
Chagrin	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Crider	Fine-silty, mixed, mesic Typic Paleudalfs
Cynthiana	Clayey, mixed, mesic Lithic Hapludalfs
*Dewey	Clayey, kaolinitic, thermic Typic Paleudults
Egam	Fine, mixed, thermic Cumulic Hapludolls
Elk	Fine-silty, mixed, mesic Ultic Hapludalfs
Faywood	Fine, mixed, mesic Typic Hapludalfs
Garmon	Fine-loamy, mixed, mesic Dystric Eutrochrepts
Grigsby	Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Holston	Fine-loamy, siliceous, thermic Typic Paleudults
Huntington	Fine-silty, mixed, mesic Fluventic Hapludolls
Lawrence	Fine-silty, mixed, mesic Aquic Fragiudalfs
Lonewood	Fine-loamy, siliceous, mesic Typic Hapludults
Lowell	Fine, mixed, mesic Typic Hapludalfs
Melvin	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
*Monongahela	Fine-loamy, mixed, mesic Typic Fragiudults
Nelse	Coarse-loamy, mixed, nonacid, mesic Mollic Udifluvents
Newark	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
Newbern	Loamy, mixed, mesic Lithic Eutrochrepts
Renox	Fine-loamy, mixed, mesic Ultic Hapludalfs
Rohan	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Sensabaugh	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Stokly	Coarse-loamy, mixed, acid, mesic Aeric Fluvaquents
Teddy	Fine-loamy, siliceous, mesic Typic Fragiudults
Trappist	Clayey, mixed, mesic Typic Hapludults
Trimble	Fine-loamy, siliceous, mesic Typic Paleudults
*Waynesboro	Clayey, kaolinitic, thermic Typic Paleudults

TABLE 21.--GEOLOGIC SYSTEMS, FORMATIONS, AND PREDOMINANT SOILS

System	Depth	Formation (position)	Predominant soils
Quaternary	5-60	(foot slopes and terraces)	Renox
			Monongahela
			Elk
			Lawrence
			Holston
			Waynesboro
		(flood plains, Cumberland River)	Grigsby
			Huntington
			Melvin
			Newark
			Stokly
		(flood plains, tributaries)	Chagrin
			Sensabaugh
			Newark
Mississippian	50-150	St. Louis Limestone	Dewey
			Caneyville
	35-140	Salem and Warsaw Limestones	Lonewood
			Dewey
			Caneyville
			Teddy
	190-310	Fort Payne Formation,(ridges)	Trimble
			Crider
			Dewey
		(side slopes)	Garmon
			Newbern
			Carpenter
Devonian	4-50	Chattanooga Shale	Trappist
			Rohan
Ordovician	10-130	Cumberland Formation	Lowell
			Faywood
			Cynthiana
	10-130	Leipers Limestone	Cynthiana
			Faywood
	0-20	Catheys Limestone	Cynthiana

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If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquiries

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).